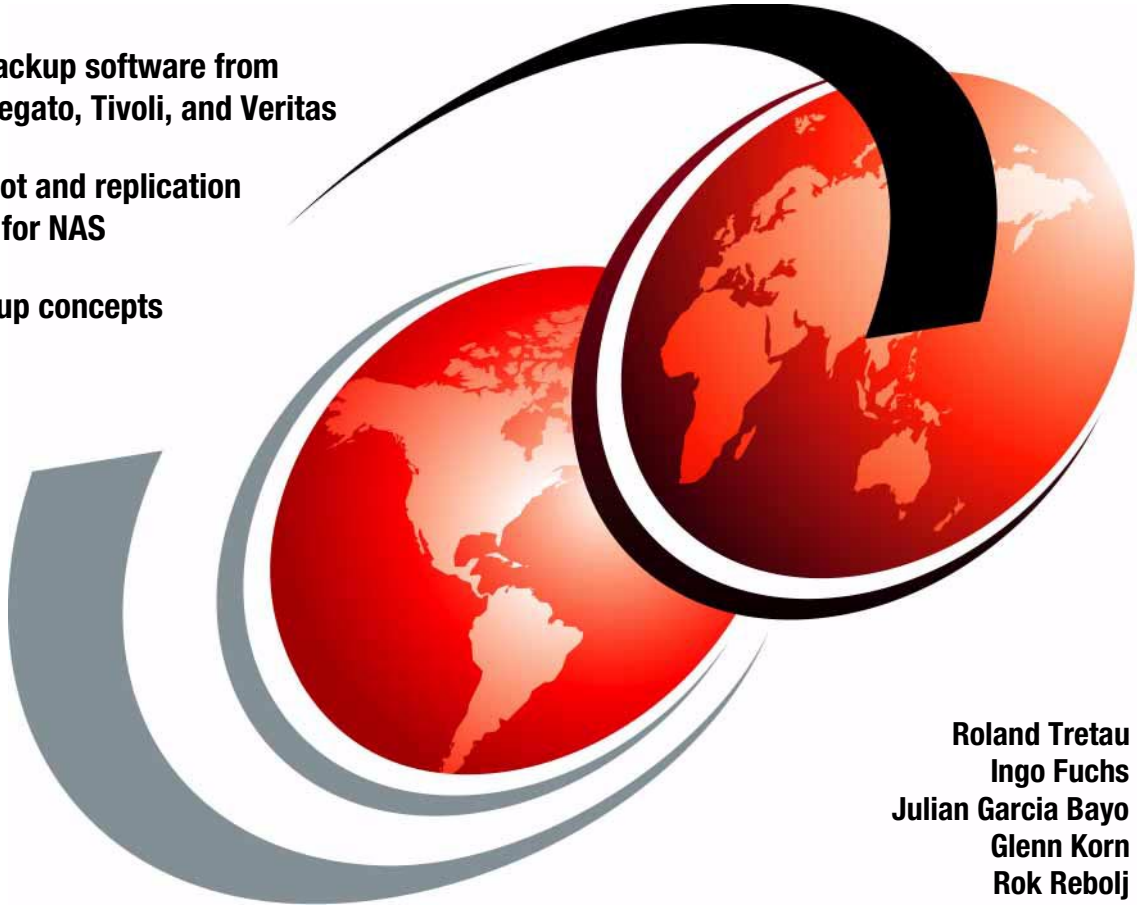
# IBM TotalStorage NAS Backup and Recovery Solutions

- Integrate backup software from BakBone, Legato, Tivoli, and Veritas
- See snapshot and replication technology for NAS
- Learn backup concepts for iSCSI



Roland Tretau
Ingo Fuchs
Julian Garcia Bayo
Glenn Korn
Rok Rebolj

Redbooks

ibm.com/redbooks

International Technical Support Organization

# IBM TotalStorage NAS Backup and Recovery Solutions

July 2002

SG24-6831-00

**Take Note!** Before using this information and the product it supports, be sure to read the general information in “Notices” on page xv.

**First Edition (July 2002)**

This edition applies to the IBM TotalStorage Network Attached Storage 200 and 300 running the Windows Powered OS.

Comments may be addressed to:
IBM Corporation, International Technical Support Organization
Dept. QXXE  Building 80-E2
650 Harry Road
San Jose, California 95120-6099

When you send information to IBM, you grant IBM a non-exclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

**© Copyright International Business Machines Corporation 2002.  All rights reserved.**
Note to U.S Government Users – Documentation related to restricted rights – Use, duplication or disclosure is subject to restrictions set forth in GSA ADP Schedule Contract with IBM Corp.

# Contents

**Figures** . . . . . vii

**Tables** . . . . . xiii

**Notices** . . . . . xv
Trademarks . . . . . xvi

**Preface** . . . . . xvii
The team that wrote this redbook . . . . . xvii
Notice . . . . . xix
Comments welcome . . . . . xx

**Chapter 1. Introduction to IBM TotalStorage NAS backup and recovery** . . 1
1.1 Backup and recovery solutions: considerations . . . . . 2
1.1.1 Data availability hardware . . . . . 2
1.1.2 Data availability software . . . . . 3
1.1.3 Backup and recovery software . . . . . 3
1.1.4 Archival, backup, and restoration of IBM NAS appliances . . . . . 4
1.2 IBM TotalStorage NAS Recovery Procedures . . . . . 9
1.2.1 Recovering the NAS 200 . . . . . 10
1.2.2 Recovering the NAS 300 . . . . . 11

**Chapter 2. Snapshots and replication: PSM and Double-Take** . . . . . 15
2.1 Snapshots using Persistent Storage Manager (PSM) . . . . . 16
2.1.1 How PSM works . . . . . 16
2.1.2 Creating images with PSM . . . . . 19
2.1.3 Special considerations for PSM in a clustered environment . . . . . 36
2.2 Using PSM with backup software solutions . . . . . 37
2.2.1 IBMSNAP Utility . . . . . 38
2.3 Replication using NSI Double-Take . . . . . 38
2.3.1 Description of Double-Take . . . . . 39
2.3.2 Double-Take features . . . . . 39
2.3.3 Double-Take operations . . . . . 40
2.3.4 Double-Take installation . . . . . 40
2.3.5 Setting up Double-Take . . . . . 41
2.3.6 Creating a mirror . . . . . 43

**Chapter 3. Microsoft Windows NT Backup** . . . . . 51
3.1 NT Backup . . . . . 52

© Copyright IBM Corp. 2002 

3.1.1 IBMSNAP utility . . . 59
3.1.2 Using IBMSNAP with NT Backup . . . 60
3.1.3 Creating a scheduled NT Backup with IBMSNAP . . . 64

**Chapter 4. Tivoli Storage Manager (TSM)** . . . 67
4.1 Introduction to Tivoli Storage Manager . . . 68
4.2 Agent installation and configuration . . . 72
4.3 Server configuration . . . 79
4.4 Starting a Backup . . . 83
4.4.1 Using IBMSNAP with TSM . . . 85
4.4.2 Creating a scheduled TSM backup using IBMSNAP . . . 90

**Chapter 5. BakBone NetVault** . . . 91
5.1 Introduction to BakBone NetVault . . . 92
5.2 Agent installation and configuration . . . 93
5.3 Server configuration . . . 103
5.4 Starting a backup . . . 107

**Chapter 6. VERITAS Backup Exec** . . . 115
6.1 Introduction to Veritas Backup Exec . . . 116
6.2 Remote Agent installation and configuration . . . 117
6.3 Backup procedure . . . 126
6.3.1 Monitoring the backup job . . . 133

**Chapter 7. VERITAS NetBackup DataCenter** . . . 139
7.1 Introduction to Veritas NetBackup DataCenter . . . 140
7.2 Agent installation and configuration . . . 141
7.3 Server configuration . . . 149
7.4 Starting a backup . . . 159

**Chapter 8. Legato NetWorker** . . . 163
8.1 Introduction to Legato NetWorker . . . 164
8.2 Agent installation and configuration . . . 165
8.3 Server configuration . . . 171
8.4 Starting a backup . . . 176

**Chapter 9. Backup and restore considerations for iSCSI** . . . 179
9.1 Introduction to iSCSI . . . 180
9.2 Backup and recovery of user data . . . 181
9.3 Recovery of the IBM TotalStorage IP Storage 200i . . . 182

**Abbreviations and acronyms** . . . 185

**Related publications** . . . 193
IBM Redbooks . . . 193

Referenced Web sites . . . . . 194
How to get IBM Redbooks . . . . . 195
IBM Redbooks collections . . . . . 195

**Index** . . . . . 197

# Figures


1-1 Persistent Storage Manager — Scheduling menu screen . . . . . 6
2-1 PMS's copy-on-write process . . . . . 17
2-2 Process flow of reading a True Image . . . . . 18
2-3 Microsoft Windows 2000 for NAS main screen . . . . . 20
2-4 Disks screen . . . . . 20
2-5 PSM main screen. . . . . 21
2-6 PSM Global Settings screen . . . . . 21
2-7 PSM Volume Settings screen . . . . . 23
2-8 PSM attributes of a volume . . . . . 24
2-9 PSM Screen containing already-created images. . . . . 25
2-10 Create Image screen . . . . . 26
2-11 Persistent Image List screen . . . . . 27
2-12 Screen showing the image created . . . . . 28
2-13 Screen for creating a new scheduled persistent image . . . . . 29
2-14 Screen showing scheduled persistent images. . . . . 30
2-15 Choose the Persistent Image to restore. . . . . 32
2-16 PSM Disaster Recovery screen . . . . . 33
2-17 PSM Disaster Recovery Properties screen . . . . . 33
2-18 Backing up Disaster Recovery Image . . . . . 34
2-19 PSM Disaster Recovery Image created. . . . . 35
2-20 PSM error when failing over a disk . . . . . 37
2-21 Double-Take — Server List . . . . . 41
2-22 Double-Take — Logon to Server . . . . . 41
2-23 Double-Take — No Activation Code Entered . . . . . 42
2-24 Double-Take — Activation Code Server Properties Window. . . . . 43
2-25 Double-Take — Connection Wizard . . . . . 44
2-26 Double-Take — Connection Wizard . . . . . 44
2-27 Double-Take — Choosing Source System . . . . . 45
2-28 Double-Take — Choosing Target System . . . . . 46
2-29 Double-Take — Creating Replication Set . . . . . 46
2-30 Double-Take — Defining Replication Set . . . . . 47
2-31 Double-Take — Destination of Data . . . . . 47
2-32 Double-Take — Destination Browse Window . . . . . 48
2-33 Double-Take — Destination Complete . . . . . 48
2-34 Double-Take — Connection Wizard Finished . . . . . 49
2-35 Double-Take — Verifying Replication Set . . . . . 50
3-1 NT Backup — NAS Backup Wizard . . . . . 53
3-2 NT Backup — Backup Logs screen . . . . . 54


© Copyright IBM Corp. 2002

3-3 NT Backup — NAS Backup log, page 1 . . . . . 55
3-4 NT Backup — NAS Backup log, page 2 . . . . . 56
3-5 NT Backup — Backup and Recovery Wizard default screen. . . . . 57
3-6 NT Backup — Backup and Recovery Wizard restore screen . . . . . 58
3-7 NT Backup — Restore Progress screen . . . . . 59
3-8 Sample batch file calling NT Backup . . . . . 60
3-9 Screen showing IBMSNAP running and PSM creating an image . . . . . 61
3-10 NT Backup started automatically by IBMSNAP . . . . . 61
3-11 On-going backup of removable disk F with PSM image of drive H . . . . 62
3-12 Successful completion of IBMSNAP and NT Backup . . . . . 63
3-13 Screen showing the backup file created . . . . . 63
3-14 Sample batch file that calls IBMSNAP . . . . . 64
3-15 Sample batch file that calls NT Backup . . . . . 64
3-16 Screen showing the scheduled job for IBMSNAP . . . . . 65
4-1 TSM Client Configuration Wizard — default screen . . . . . 73
4-2 TSM Client Configuration Wizard — Option File Task. . . . . 74
4-3 TSM Client Configuration Wizard — TCP/IP Parameters . . . . . 75
4-4 TSM Client Configuration Wizard — Domain List . . . . . 76
4-5 TSM Client Configuration Wizard — Include-Exclude Options . . . . . 76
4-6 TSM Client Configuration Wizard — Login to a TSM server . . . . . 77
4-7 TSM Client — default screen after installation. . . . . 78
4-8 TSM Client Node Configuration Wizard — Define TSM client nodes . . 79
4-9 TSM Client Node Configuration Wizard — Node properties . . . . . 80
4-10 TSM Client Node Configuration Wizard — TSM client nodes . . . . . 81
4-11 TSM Server — Web Administration Interface node list . . . . . 82
4-12 TSM Client — Backup selection . . . . . 83
4-13 TSM Client — Backup report . . . . . 84
4-14 Sample IBMSNAP batch file . . . . . 85
4-15 Sample batch file calling TSM . . . . . 86
4-16 Screen right after running IBMSNAP batch file . . . . . 87
4-17 Commands of the batch file being executed . . . . . 87
4-18 Files being backed up by TSM. . . . . 88
4-19 Screen showing PSM and TSM processes completing successfully. . . 88
4-20 TSM Web Admin screen showing the backups available . . . . . 89
4-21 Screen showing the backup details . . . . . 90
5-1 NetVault Autorun screen . . . . . 93
5-2 NetVault Welcome screen . . . . . 94
5-3 NetVault — User Information. . . . . 95
5-4 NetVault — Program Destination. . . . . 96
5-5 NetVault — Database Location . . . . . 97
5-6 NetVault Setup type. . . . . 98
5-7 NetVault Setup Type — Custom System. . . . . 99
5-8 NetVault — Enter Machine Name . . . . . 100

5-9 NetVault — Enter Password . . . . . 101
5-10 NetVault — Setup Complete . . . . . 102
5-11 NetVault — Default Screen . . . . . 103
5-12 NetVault — client management . . . . . 104
5-13 NetVault — System Access Password . . . . . 105
5-14 NetVault — System Access Passed . . . . . 105
5-15 NetVault — Client Management with NAS200 . . . . . 106
5-16 NetVault — Backup . . . . . 107
5-17 NetVault — client selection . . . . . 108
5-18 NetVault — file system plug-in . . . . . 108
5-19 NetVault — file system backup options . . . . . 109
5-20 NetVault — backup schedule . . . . . 110
5-21 NetVault — backup target . . . . . 111
5-22 NetVault — Advanced Backup Options . . . . . 112
5-23 NetVault — Run Status . . . . . 113
5-24 NetVault — Job Monitor . . . . . 113
5-25 NetVault — Device Management . . . . . 114
6-1 Backup Exec Introduction window . . . . . 117
6-2 Start Backup Exec Installation . . . . . 118
6-3 Software License Agreement . . . . . 118
6-4 Backup Exec Information . . . . . 119
6-5 Backup Exec components selection . . . . . 119
6-6 Backup Exec Serial Numbers . . . . . 120
6-7 Remote Install Options . . . . . 120
6-8 Start copying . . . . . 121
6-9 Service Pack 4 Warning . . . . . 121
6-10 Selecting domains . . . . . 122
6-11 Selecting destination systems . . . . . 122
6-12 Selected system . . . . . 123
6-13 Enter administrator account . . . . . 123
6-14 Progress window . . . . . 124
6-15 Installation finished . . . . . 124
6-16 Setup Complete . . . . . 124
6-17 Remote Agent installation folder . . . . . 125
6-18 Backup Exec Assistant . . . . . 126
6-19 Backup Wizard . . . . . 127
6-20 Selecting Remote Machine . . . . . 127
6-21 Backup Exec Warning . . . . . 128
6-22 Selecting files . . . . . 128
6-23 Backup Names . . . . . 129
6-24 Selecting backup device and media . . . . . 129
6-25 Media overwrite method . . . . . 130
6-26 Backup Type and Verification . . . . . 131

6-27 Completing the Backup Wizard . . . 131
6-28 Schedule Options . . . 132
6-29 Monitor Jobs . . . 133
6-30 Activity Monitor . . . 133
6-31 Job Progress . . . 134
6-32 Job Log . . . 135
6-33 Job Verify progress . . . 136
6-34 Job Successful . . . 136
6-35 Job on media . . . 137
7-1 NetBackup — autorun screen . . . 141
7-2 NetBackup — Welcome . . . 142
7-3 NetBackup — Client Setup Type . . . 142
7-4 NetBackup — OTM Install . . . 143
7-5 NetBackup — Client Name . . . 144
7-6 NetBackup — Destination Location . . . 144
7-7 NetBackup — Program Folder . . . 145
7-8 NetBackup — Client Options . . . 145
7-9 NetBackup — Client Options screen . . . 146
7-10 NetBackup — Client Summary . . . 147
7-11 NetBackup — Install Summary . . . 147
7-12 NetBackup — Setup Complete . . . 148
7-13 NetBackup — Administration . . . 149
7-14 NetBackup — Backup Policy Management . . . 150
7-15 NetBackup — New Class . . . 150
7-16 NetBackup — Add a New Class . . . 151
7-17 NetBackup — Backup Policy Configuration Wizard . . . 151
7-18 NetBackup — Class Name and Type . . . 152
7-19 NetBackup — Client List . . . 153
7-20 NetBackup — Files . . . 154
7-21 NetBackup — Backup Type . . . 155
7-22 NetBackup — Rotation . . . 156
7-23 NetBackup — Start Window . . . 157
7-24 NetBackup — NAS class . . . 158
7-25 NetBackup — Backup selection . . . 159
7-26 NetBackup — Backup Options . . . 160
7-27 NetBackup — Backup initiated . . . 160
7-28 NetBackup — Backup finished . . . 161
8-1 NetWorker — autorun screen . . . 165
8-2 NetWorker — File Download screen . . . 166
8-3 NetWorker — Setup Type . . . 167
8-4 NetWorker — Allowed Servers . . . 168
8-5 NetWorker — Ready to Install the Program . . . 169
8-6 NetWorker — Completing the NetWorker Setup Wizard . . . 170

8-7 NetWorker — Administrator . . . . . 171
8-8 NetWorker — Manage Clients . . . . . 172
8-9 NetWorker — Create Client . . . . . 173
8-10 NetWorker — Create Client window . . . . . 174
8-11 NetWorker — New Client . . . . . 175
8-12 NetWorker — User . . . . . 176
8-13 NetWorker — Backup . . . . . 177
8-14 NetWorker — Backup Status . . . . . 178
9-1 iSCSI uses block I/O . . . . . 180
9-2 DAS uses block I/O . . . . . 181
9-3 iSCSI — Backup configuration . . . . . 183
9-4 iSCSI — Restore configuration . . . . . 184

# Tables

4-1 Sample NAS disk configuration . . . . . 85

© Copyright IBM Corp. 2002 

# Notices

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:
*IBM Director of Licensing, IBM Corporation, North Castle Drive Armonk, NY 10504-1785 U.S.A.*

**The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law**: INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

COPYRIGHT LICENSE:
This information contains sample application programs in source language, which illustrates programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. You may copy, modify, and distribute these sample programs in any form without payment to IBM for the purposes of developing, using, marketing, or distributing application programs conforming to IBM's application programming interfaces.

© Copyright IBM Corp. 2002 

# Trademarks

The following terms are trademarks of the International Business Machines Corporation in the United States, other countries, or both:

| | | |
|---|---|---|
| AFS® | Netfinity® | SANergy™ |
| AIX® | PAL® | SP™ |
| AIX 5L™ | Perform™ | TCS® |
| DB2® | PowerPC® | Tivoli® |
| DFS™ | Predictive Failure Analysis® | TotalStorage™ |
| ESCON® | RACF® | xSeries™ |
| IBM® | Redbooks™ | zSeries™ |
| Metaphor® | Redbooks(logo)™ | |
| Micro Channel® | RMF™ | |

The following terms are trademarks of International Business Machines Corporation and Lotus Development Corporation in the United States, other countries, or both:

| | | |
|---|---|---|
| Domino™ | Lotus® | Word Pro® |

The following terms are trademarks of other companies:

ActionMedia, LANDesk, MMX, Pentium and ProShare are trademarks of Intel Corporation in the United States, other countries, or both.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

C-bus is a trademark of Corollary, Inc. in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

SET, SET Secure Electronic Transaction, and the SET Logo are trademarks owned by SET Secure Electronic Transaction LLC.

Other company, product, and service names may be trademarks or service marks of others.

# Preface

This IBM Redbook is a guide for backup and recovery solutions for IBM TotalStorage NAS and iSCSI appliances. It provides a detailed description of how to implement various backup and restore solutions.

This hands-on guide starts with an introduction to IBM TotalStorage NAS backup and recovery solutions and covers general concepts. After that you will learn about persistent storage images and data replication techniques. Then you will see various solutions for popular backup and recovery software.

This book covers the following backup software products:

- **Microsoft** Windows NT Backup
- **Tivoli** Storage Manager
- **BakBone** Software NetVault
- **Veritas** BackupExec and NetBackup
- **Legato** NetWorker

Additionally, the book includes tools and utilities provided by IBM to support backup of the IBM TotalStorage NAS devices, as well as special considerations for iSCSI environments.

## The team that wrote this redbook

This redbook was produced by a team of specialists from around the world working at the International Technical Support Organization, San Jose Center.

© Copyright IBM Corp. 2002

*The team, from left to right: Julian, Glenn, Rok, Roland, Ingo*

**Roland Tretau** is a Project Leader with the IBM International Technical Support Organization, San Jose Center. Before joining the ITSO in April 2001, Roland worked in Germany as an IT Architect for Cross Platform Solutions and Microsoft Technologies. He holds a Masters degree in Electrical Engineering with a focus in telecommunications.

**Ingo Fuchs** is a Chief IT Architect and Alliance Manager at Memorex Systemhaus in Frankfurt, Germany. His areas of expertise include Storage Networking (SAN/NAS), Intel-based server systems and high-availability solutions. Ingo holds a Masters degree in Information Technology with focus in Project Engineering, and has a teaching share at the University of Cooperative Education in Mannheim, Germany.

**Julian Garcia Bayo** is a Storage expert and consultant with IBM Spain in the SSG Group. He holds a Masters degree in Telecommunications Engineering with a focus in Electronic Equipment. His areas of expertise include Storage Networking Solutions (NAS/SAN), Microsoft and Linux Operating Systems, and disk subsystems. He is a Microsoft Certified Systems Engineer (MCSE) and an IBM Certified Specialist for xSeries and Enterprise Disk Solutions.

**Glenn Korn** is a member of the Technical Support Marketing group for the IBM SSG group, where he specializes in SAN and NAS solutions. Glenn has been working with computer hardware and networks for over 12 years. He has extensive experience in IT support of both hardware and software. He holds a B.S. degree in Industrial Technology and is a Microsoft Certified Systems Engineer (MCSE) and Novell CNE.

**Rok Rebolj** is a Systems Engineer and Instructor in Slovenia. He has 8 years of experience in the IT field. He holds a degree in Electronics Engineering from the University in Ljubljana. His areas of expertise include IBM Netfinity and xSeries servers, storage networking, and systems management. He is a Microsoft Certified Systems Engineer (MCSE) and IBM Certified Expert for xSeries.

Thanks to the following people for their contributions to this project:

Yvonne Lyon, Emma Jacobs, Deanna Polm
International Technical Support Organization, San Jose Center

Frank Tutone, Gary Diamanti, Girish Venkatachaliah
IBM US

Natalie Longhini, Tracy James
BakBone Software

Jim Edmonds
VERITAS Software

# Notice

This publication is intended to help customers who want to back up and recover IBM TotalStorage Network Attached Storage systems. The information in this publication is not intended as the specification of any programming interfaces that are provided by IBM TotalStorage storage network products and solutions. See the PUBLICATIONS section of the IBM Programming Announcement for IBM TotalStorage for more information about what publications are considered to be product documentation.

# Comments welcome

Your comments are important to us!

We want our Redbooks to be as helpful as possible. Send us your comments about this or other Redbooks in one of the following ways:

- Use the online **Contact us** review redbook form found at:

  **ibm.com**/redbooks

- Send your comments in an Internet note to:

  redbook@us.ibm.com

- Mail your comments to the address on page ii.

1

# Introduction to IBM TotalStorage NAS backup and recovery

In our computing world today, data is considered the most important competitive differentiating factor. Temporary inaccessibility or the complete loss of data has a huge financial impact, and can drive companies out of business. The inability to manage data can have a negative impact on a company's profitability and limit its ability to grow. Storing, protecting, and managing data growth has become one of the major challenges of today's businesses. For these reasons, it is essential that disaster recovery and backup/restore procedures be properly planned and implemented to meet the high demand for security and safety of data.

The IBM TotalStorage NAS devices are designed to plug into your current data protection scheme. Unlike other NAS appliances, the IBM TotalStorage NAS devices do not depend on special vendor-provided versions of software but work with out-of-the-box backup software. If you use Tivoli Storage Manager (TSM) as your enterprise backup solution, you will be pleased to know that the IBM NAS devices are shipped with a TSM client already installed. Also, if you do not already have a data protection scheme in place, the IBM NAS systems come bundled with their own complete backup software solution.

© Copyright IBM Corp. 2002

## 1.1 Backup and recovery solutions: considerations

As in many other areas, planning is the key to successful backup and recovery of your IBM TotalStorage NAS devices and the user and application data stored on it. In this chapter we explain the key features and functionalities that IBM provides with their devices to ensure data availability and easy backup and recovery.

IBM provides you with hardware to maximize system uptime and data availability. This way, the failure of hardware components (such as disk drives or power supplies) does not affect the availability of data on the network. Almost no disruption of your business occurs, as the redundancy features provide protection against most possible hardware failures.

The next level of hardware redundancy is clustering. This way, if one NAS system should become unavailable, the data will still be accessible to users quickly and automatically from a second clustered NAS device. This is implemented in the IBM TotalStorage NAS 300.

For even higher data availability you might want to use data replication technology to replicate data to a remote system or remote site. IBM supports NSI's Double-Take product (see 2.3, "Replication using NSI Double-Take" on page 38).

On the other hand, if you already have a Storage Area Network (SAN) environment with replication technology (for example, IBM ESS with PPRC) you can use the IBM TotalStorage NAS 300G to leverage your existing SAN as a back-end storage repository to your NAS devices.

Furthermore, IBM supports you in the task of backup and recovery — primarily for archival and disaster recovery purposes — by providing backup software products with the IBM TotalStorage NAS devices.

### 1.1.1 Data availability hardware

IBM ships the NAS appliances with a wide range of data availability features. This includes:

- Redundant fans and power supplies to ensure system availability
- Light Path diagnostics and system management processors for fast error diagnose
- RAID controllers to protect against disk failure (system and user data)
- Predictive Failure Analysis (PFA) notifies the user of an imminent failure, before it actually happens. PFA protects various hardware components.

### 1.1.2 Data availability software

To help customers ensure the availability of data, IBM ships the product Persistent Storage Manager (PSM) with the IBM TotalStorage NAS devices. PSM creates True Images (multiple point-in-time persistent images of any or all system and data volumes). All persistent images are designed to survive system power loss or a planned or unplanned reboot. Each instance of PSM handles 250 concurrent images of up to 255 independent volumes for a total of 63,750 independent data images.

Typically, any image can be easily managed through the Web interface, and accessed the same as any other active volume. In case of data corruption or loss, typically, any persistent image can be used for manual retrieval of individual files (by the administrator or end users), or more importantly, for instant restoration (by a PSM function initiated by the administrator, in the Web user interface) of the entire volume from image, which can help reduce the amount of system downtime.

A more detailed description of PSM is included in 2.1, “Snapshots using Persistent Storage Manager (PSM)” on page 16. Additional information is included in the IBM Redbook SG24-6505, Implementing IBM TotalStorage NAS, at the Web site:

http://www.redbooks.ibm.com

### 1.1.3 Backup and recovery software

IBM ships the IBM TotalStorage NAS devices with various pre-loaded software products to meet customer requirements in the area of backup and archiving. This includes:

- True Image capabilities using PSM
- Native NT Backup software
- Tivoli Storage Manager Client software
- IBMSNAP Utility as a command line tool to enhance interoperability of PSM and backup software
- IBM NAS Backup Assistant as a GUI to start NT Backup in conjunction with creating a PSM image.

These products will be presented in more detail in the following chapters.

Additionally, a wide range of backup and recovery products from independent software vendors (ISVs) is supported. More information on certified third-party software products can be found in the NAS Interoperability List at:

http://www.storage.ibm.com/snetwork/nas/nas_interoperability.html

### 1.1.4 Archival, backup, and restoration of IBM NAS appliances

Systems administrators should ensure that data stored in the NAS appliance has adequate protection against data losses due to accidental erasure, replacement, multiple disk crashes, and even disaster scenarios. In this section we discuss the options and rationales of each.

#### Archival copy of the NAS operating system on CD-ROM

IBM NAS products ship with a Recovery CD-ROM that allows the NAS administrator to restore the system to the same configuration as it was shipped from the factory. Therefore, no matter what happens to the operating system or maintenance partition, the NAS administrator can restore the operating system software from this Recovery CD-ROM. However, if the administrator has applied any fixes to the NAS product, these must be reapplied after the Recovery CD-ROM is used.

#### Archival backup of NAS OS maintenance partition

IBM Network Attached Storage products are pre configured with an operating system partition and a maintenance partition. Using the pre loaded NT Backup software, the administrator can make a backup of the operating system to the maintenance partition, and the NAS product has a wizard assistant to make this simple. Because the NAS operating system might be in use when performing the backup, it is recommended to use a True Image copy to resolve the “open file” issue when making a backup.

The included NAS Backup Assistant will create a True Image copy for its use before the NT Backup is started to ensure that the backup is complete and valid.

#### Archival backup of NAS OS to tape using NT Backup

The operating system can be backed up to tape, using the included NT Backup program and the NAS Backup Assistant. Again, to resolve the “open file” problem, the backup should employ a True Image copy, and the included NAS Backup Assistant wizard can and should be used.

## Archival backup of NAS OS to tape by other backup programs

While the NAS operating system can be backed up using the included NT Backup software, a customer may decide to back up the operating system using Tivoli Storage Manager (TSM) or a separately purchased ISV backup program. Either TSM or a purchased backup software package provides additional backup functionality to that of NT Backup. This enhanced backup software might then be used for backing up both the operating system and the user data.

Tivoli Storage Manager is discussed in Chapter 4., “Tivoli Storage Manager (TSM)” on page 67, while various ISV backup software is presented in later chapters.

## Archival backup of NAS user (client) data

System administrators need to make archival copies of their critical data. Typically, these copies are made to tape, and then these tape cartridges can be taken off-site to protect against site disaster incidents.

In many cases, the administrator will use PSM to create a True Image copy, which then will be used in the archival backup. While True Image copies are retained across NAS reboots, they are not a replacement for tape backup, as they do not create a separate copy of the data that can be transported off-site. Therefore, NAS administrators should not use True Image copies as their sole disaster-recovery approach. However, True Image copies can be used by clients to recover from problems such as an accidental file deletion.

## How archival backup accesses a PSM persistent image

Persistent Storage Manager is accessed via the NAS Administration console. This is where the PSM images are created. They are either executed immediately or scheduled for single or periodic execution.

Figure 1-1 shows the PSM schedule menu. This menu contains schedules of PSM images to be captured.

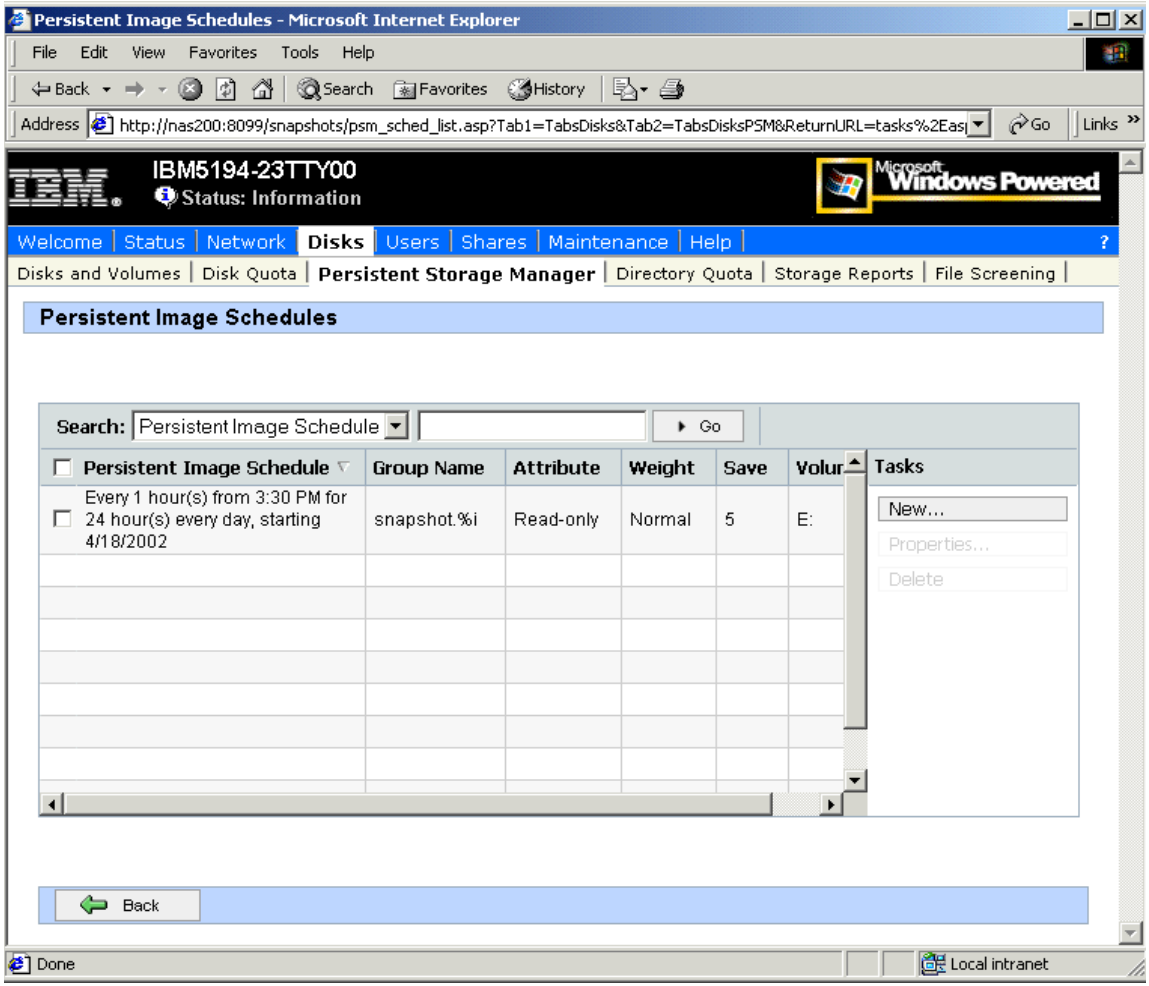



*Figure 1-1 Persistent Storage Manager — Scheduling menu screen*

## Full, incremental, and differential backups

Over time, backups can take up substantial storage. Generally, only a small amount of data changes each day or over a period of time. Therefore, backup administrators often take a backup of the changes that occur, rather than backing up a complete copy of all data. Backup software such as the pre loaded NT Backup generally has the ability to make full, incremental, or differential backups. This section gives you an overview of backup processes, but the individual backup program manuals should be consulted for in-depth descriptions and additional details.

First, most backup programs allow the administrator to select all files or a specific subset of the files to be backed up. For these selected files, a full backup, differential backup, or incremental backup can generally be requested. The distinctions between the three types of backup are as follows:

- When a *full* backup is taken, all selected files are backed up without any exception.
- When a *differential* backup is taken, all files changed since the previous full backup are now backed up. Thus, no matter how many differential backups are made, only the latest differential backup plus the original full backup are needed for any restore operation. However, the administrator should understand the particular backup software thoroughly because some backup software will back up *changed* files—but not *new* files—during a differential backup. When restoring from a differential backup, both the full backup and the latest differential backup must be used.
- An *incremental* backup is similar to a differential backup. When an incremental backup is taken, all files changed since the previous incremental or full backup are now backed up. When restoring from an incremental backup, the full backup will be needed as well as all of the incremental backups.

The NAS administrator can decide to perform a backup using all of the files from a specific True Image copy, or only some files from it. However, while the administrator can take incremental or differential backups of the drive represented by a virtual image, the administrator cannot back up the PSM persistent image cache files themselves. Therefore, should you have a situation where you have to restore user data from tape, the persistent images will be lost.

To assist the NAS administrator in making backups using either TSM or ISV software with PSM persistent image technology, IBM has provided the IBMSNAP utility. Using this utility requires knowledge of Windows batch files and a command line backup utility. IBMSNAP.EXE is a command line tool that creates a PSM persistent image virtual drive, launches backup batch files, and then sets the archive bits accordingly on the drive being backed up. It can be used in conjunction with other third-party backup utilities as long as these support command line backups and initiating a backup from the backup client. The IBMSNAP.EXE utility can be found in the c:\nas\ibm\nasbackup directory of the NAS operating system. See 2.2.1, “IBMSNAP Utility” on page 38 for further details.

**Note:** Please keep in mind that PSM is primarily used for quick and easy restores of individual files or volumes from PSM cache. In many cases it appears to be more useful to use a backup software (either TSM or a third-party software) that supports open file backup and fully exploits Windows 2000 as the backup solution. Especially in large environments, the need to create and maintain batch files might be impractical.

We do not recommend the use of PSM to create images of application data (such as IBM DB/2, Lotus Domino, or Microsoft Exchange) as the only backup solution. You should use backup software with adequate application support (such as Tivoli Data Protection modules for TSM).

## Restoration of previous persistent images

As mentioned earlier, the NAS administrator or user can restore their files from a previous True Image copy. They can perform this file restoration through a graphical drag-and-drop action or other standard file-copy method. A single file or an entire volume of files can be copied and restored in this manner. An overview of the process is as follows:

1. The NAS administrator selects the desired previous persistent image to be restored.
2. A reboot of the NAS product is performed.
3. The operating system reverts the data to the prior persistent image view.
4. The boot is completed.

The NAS administrator can perform additional database-specific actions or other recovery actions, or both. For example, the administrator can rerun any database transaction logs to bring the database up to the latest level before the restoration.

## Third-party products

The IBM appliances are sold as fixed-function boxes, and are in general not intended to be modified or changed by the customer. IBM and its vendors have cooperated to tune the performance and testing of these products in NAS environments. Additionally, the license agreements between IBM and its software vendors, and between IBM and its customers, prohibit the use of these appliances as general-purpose servers. Therefore, addition or modification of this software in the NAS system may void any support by IBM.

However, a limited number of add-on applications have been tested with these NAS products, and customers may add those specific software applications to the system. Should a customer have problems with non-IBM software that they have added to this appliance, the customer should contact the vendor directly, as IBM does not provide on-site or remote telephone support for those non-IBM products.

IBM will continue to support hardware and software that is shipped with the NAS appliance. However, in certain circumstances, any non-IBM software may have to be uninstalled for IBM service to provide problem determination on the IBM hardware and software.

IBM has tested, and will continue to test, a variety of vendor software products. To see the status and additional details of this testing, customers can go to the IBM Support Web site at:

http://www.storage.ibm.com/snetwork/nas/index.html

### AntiVirus scan

The IBM TotalStorage NAS products do not come preloaded with antivirus software. They are considered as a closed system configuration and are less susceptible to viral infection. However, an antivirus scan of the storage can be performed from clients that have the appropriate access permissions. Also, Norton AntiVirus Version 7.1 or later can be installed using normal Windows 2000 software installation procedures. Additionally, some ISV backup software has options to scan for viruses during backup processing.

Depending on configuration options, antivirus scanning can use substantial processor, disk, or network resources. Therefore, scanning options and scan schedules should be carefully selected to minimize the impact to system resources. A good recommendation is to schedule it during off-peak hours.

**Note:** For more information, read the IBM white paper by Jay Knott entitled “NAS Cache Systems, Persistent Storage Manager and Backup”, available at:

http://www.storage.ibm.com/snetwork/nas/whitepaper_nas_cache_systems.html

## 1.2 IBM TotalStorage NAS Recovery Procedures

For this chapter we assume that the IBM TotalStorage NAS device needs to be recovered after a disaster, meaning that the complete system data needs to be re-installed and configured.

Re-initializing the unit is very simple, as it comes with CD-ROMs for this purpose. However, the unit also has a protection system to prevent it from being accidentally re-initialized if the CD-ROM is left in the drive during a reboot. To circumvent this protection, you must use the Recovery Enablement Diskette and follow the procedure described below.

## 1.2.1 Recovering the NAS 200

The IBM NAS 200 can be recovered either using a recovery CD or using the maintenance disk partition. It is assumed you have a keyboard and monitor connected locally.

### Using the recovery CD

This method removes any configuration done on the NAS 200. Before you start the recovery procedure, you must delete any persistent images currently present on your system.

To recover the preloaded image on your appliance:

1. Insert the diskette into the diskette drive and CD#1 in the CD-ROM, then restart the appliance. When the Recovery Enablement Diskette has completed loading and modifying your appliance start-up sequence, it will warn you about losing all data on the C drive. If you continue, the CD image process will start. Follow the directions on screen and replace the CDs when asked.
2. Remove the Recovery Enablement Diskette from the diskette drive and the last CD from the CD-ROM drive. When the process is finished, the system will reboot automatically.
3. The original manufacturing preload will be restored. Reinstall all software updates that has been installed on the Model before. Reconfigure shared folders, users, permissions and applications.
4. Apply service packs as needed.

**Note:** Refer to the backup book for different ways to back up and restore your NAS appliances.

### Using the maintenance disk partition

To avoid to create the users, shared folders and permissions again you can use tools such Persistent Storage Manager to create a operating system image. In order for this process to work, you need to meet the following prerequisites:

1. Have a previous backup of operating system: See 2.2.1, “IBMSNAP Utility” on page 38.

2. Have a diskette format with the following files: BOOT.INI, NTDETECT.COM, NTLDR

By following these steps, you can recover the NAS 200 appliances:

1. Change the boot order: Press F1 when the NAS appliances starts and put in this order:
   a. First Startup Device [Diskette Drive 0]
   b. Second Startup Device [Cd Room]
   c. Third Startup Device [Hard Disk 0]
2. In order to restore the backup, temporarily install Windows 2000 Server into the maintenance partition. The installation processes will show you this partition with 6.4 GB. when the installation is asking you to format the partition. Choose **leave the current file system intact (No changes)**.
3. Boot on the maintenance partition using a Disk Boot and configure all necessary software (for example, TSM Client) to have the necessary connections to the backup server, if necessary.
4. From the maintenance partition, invoke **Restore To System Partition**.
5. Make sure no errors occurred during the restore processes.
6. Reboot the NAS 200.

## 1.2.2 Recovering the NAS 300

The restoration for a single NAS 300 node is the same as described for the NAS 200. We are now showing how to restore the NAS 300 in a clustered environment.

### Reloading a NAS 300 after one node of a cluster fails

In this section we demonstrate how to reload one node in a clustered environment. We will call this system “new node” for demonstration purposes, and we are going to use the NAS setup navigator to accomplish the reload. There is an assumption of a local keyboard, mouse, and monitor.

1. Place the enablement diskette and CD#1 into the new node.
2. Reboot the new node.
3. Supply CDs to system as required. The system should reboot when finished.

**Note:** Since the new system name will already exist in the cluster and either an NT domain or Active Directory, a few additional steps are required. For best practices, we are going to give the new node the same name that it had previously, which is why these steps are necessary.

4. Log on to the working system (not the new node) and go into Cluster Administration. The node that is being reloaded will be represented by an icon with a circle and red slash. You need to evict that node from the cluster. Right-click that node —> **Evict Node**.

**Note:** The next step will need to be performed on the working system if it contains the Active Directory you are using. If the domain information is located elsewhere, you will need to connect to the appropriate system and remove the name of the new node before recreating.

5. From the same working system, go to **Start** —> **Programs** —> **Administrative Tools** —> **Active Directory Users and Computers**. Open up the computers folder and remove the failed system. This removes the system from Active Directory. (For an NT domain, use **Star** —> **Programs** —> **Administrative Tools** —> **Server Manager**, find the failed system in the list and delete). You are done on this node for now.
6. Log in to the new system with Administrator and password again. The NAS Setup Navigator will start.

**Note:** Perform step 9 if you have DNS loaded on the cluster. The new node would have had DNS on it.

7. Load DNS on the new server. Do this by **Start**—>**Settings**—> **Control Panel**—>**Add/Remove Programs**—>**Add/Remove Windows Components**—>**Networking Services**. Click the box to check Networking Services and then click the **Details** button. The Subcomponents of Networking Services box comes up. Click the box next to Domain Name System, then click **OK.**
8. In NAS Setup Navigator, on the Information and Setup Options screen, select the radio button that applies to the new node and Active Directory (if needed). After you have selected the appropriate radio buttons, click **Apply**. Clicking the **Apply** button will refresh the screen and bring you back to the top of the Information and Setup Options screen.
9. Click the **Forward** button to advance to the next screen
10. Follow these steps and screens and configure the new node. When you are done with each screen, click the **Forward** button to advance.

Configure the new node with the appropriate information for:

- System Language
- Administrator Password
- Date and Time

- Network Identification
- Public LAN Settings
- Private LAN Settings

**Note:** At this point in the install of new node, you will either get the Joining a Domain screen or the Active Domain Controller Setup screen. The Information and Options screen where you either selected Joining a Domain or Setup Active Domain Controller determines this.

11. This step requires you to either join a domain or set up Active Directory depending on what radio buttons were selected in the beginning of the NAS Setup Navigator.
12. Now you will join the cluster. Follow the TotalStorage Cluster Configuration Wizard as the joining node.
13. Once you have successfully joined the cluster, verify in Cluster Administration that both nodes are present. (The existing node and the new node)

At this time you have reloaded your IBM TotalStorage NAS appliance in a cluster.

2

# Snapshots and replication: PSM and Double-Take

In this chapter we provide an introduction to the snapshot and replication features of IBM TotalStorage NAS systems. Although it is not a necessary part of a backup and recovery solution, we believe that an understanding of snapshot and replication solutions will assist you in planning the protection of your valuable data — along with implementing a backup solution using one of the products described later in this book.

© Copyright IBM Corp. 2002

## 2.1 Snapshots using Persistent Storage Manager (PSM)

Persistent Storage Manager (PSM) is a utility that creates point-in-time images of the file system on the NAS unit.

This is done by using a copy-on-write technique that uses, for each volume, an area of pre-allocated storage (the PSM cache file) that keeps only those data blocks which have been written since the time you made a persistent image of the volume.

This image then can be used to restore accidentally deleted files, corrupted data, or can even be used to back up data to another location (disk or tape). Also, this image is sometimes called Persistent True Image (PTI), because it is:

- **Persistent:** Images survive accidental or intentional reboots, file corruption, and system crashes, and are highly resistant to virus attacks
- **True Image:** Data is managed at the block level of the device, even though files and folders are presented to the users

PSM is preloaded in the IBM TotalStorage NAS devices.

PSM's most important function is its capability to create a True Image (other terms are point-in-time image, snapshot) of open files, eliminating the necessity to shutdown applications. It does this using its component called Open Transaction Manager (OTM). With point-in-time images, you can run your backup while the system I/O continues.

### 2.1.1 How PSM works

PSM runs and operates below the file system as a storage filter class driver, intercepting all write actions to the NAS volumes.

When the command to create a True Image is executed, PSM begins monitoring the file system looking for a quiescent period. The quiescent period provides sufficient time for completion of writes and for the various software buffers to flush.

The premise is that, by the end of the quiescent period, a volume will be created which is in a "stable" state. This means that the volume is at rest, the caches has been flushed, and the data is consistent.

If the volume is captured in a "stable" state, then all its contents (files and folders) can be returned to a "usable condition" for user access. If quiescence is not achieved within the allocated period, the True Image will not be created.

Following the quiescent period, PSM creates the persistent True Image, a virtual point-in-time representation of the volume. This True Image is presented in folders and files structure in exactly the same manner as they are presented on the source volume (see Figure 2-1 on page 31). Metaphorically, the True Image contains the data that was overwritten on the live volume from the time of the previous True Image creation to the creation of the current True Image.

In reality, at the time of True Image creation, PSM sets up junction points, to the Diff Data maintained in the PSM area. The actual creation of the True Image requires minimal resources and time.

## Writing to a PSM NAS volume

When a write I/O is sent to the production volume after a True Image has been created, PSM intercepts and pauses the request, reads the data (or the blocks) that is to be overwritten, and saves the data in a Diff directory within the PSM-specific cache file. After the original data has been copied to the cache, PSM releases the new data and it is written to the live (production) volume. This process is called “copy-on-write”. It is shown in Figure 2-1.

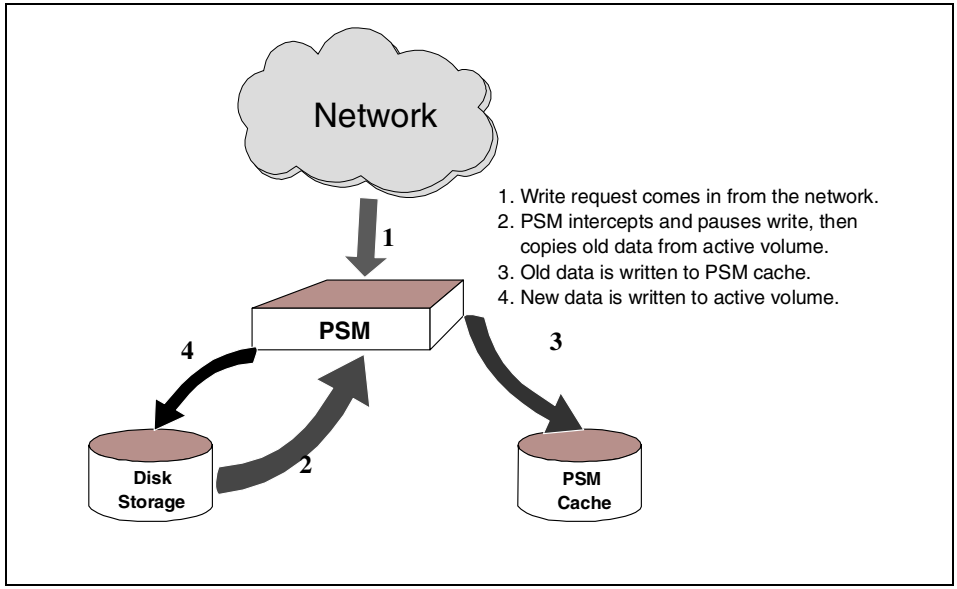



*Figure 2-1 PMS’s copy-on-write process*

## Reading a True Image

True Images may consist of data on both the active volume and PSM cache. If this is the case, and there is a requirement to read the True Image (for backup purpose or data retrieval), PSM determines whether data has changed (data is now on the PSM cache) or is still unchanged on the active volume. Then PSM retrieves the data accordingly (whether on PSM cache or active volume) and presents it to the user. See Figure 2-2 for the process flow.

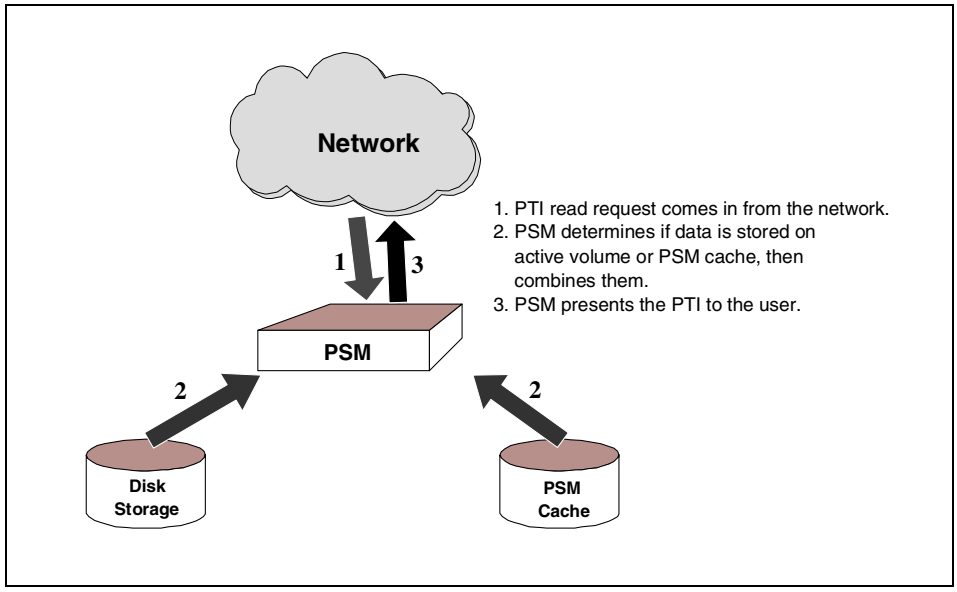



*Figure 2-2 Process flow of reading a True Image*

Processes such as backup or restore having access through a persistent image, have a lower priority than normal read and write operations. Therefore, if the NAS device is experiencing heavy client utilization, and at the same time a backup program is launched to access the True Image, the latter will have lesser priority for minimal performance impact.

While creating the PSM images happens very quickly, it may take a few minutes before that image is visible and available to the users. Generally, the very first image will take much longer to create than subsequent images.

## Performance impact of PSM

The performance considerations for PSM can be subdivided into write performance and read performance.

***Write performance***
PSM creates minimal additional I/O overhead which is limited to writes. The copy-on-write process adds one read (the write is paused to read the old data from the live volume) and one write (old data is copied to PSM cache) to each write system request.

***Read performance***
Reads are merely affected, since typically 90% of all I/O activities are reads directly from the live volume, which causes no interaction with PSM. However, when access to True Images is required (backup, prototypes, compatibility testing), this causes interaction with PSM for data retrieval from live volume, PSM cache, or both. This, as discussed earlier, has a lower priority.

**Note:** PSM is designed for the main purpose of quick data retrieval, as well as creating readily available images for other functions (such as backup and development testing) even with open files (no need for application shutdown). Although it can be used for backup purposes, backup performance is not an issue PSM was designed to address.

## 2.1.2 Creating images with PSM

To access the PSM functions, you need to get connected to the NAS system via Web interface as seen in the next steps:

1. Open your Internet Explorer (you may also connect by using Terminal Services or locally) and use the following example, modified for your environment:

   ```
   http: //computername or ip address:8099
   ```

2. When prompted for a username and password, use the administrative account (for example, administrator, password).
3. The NAS main screen will appear, as shown in Figure 2-3.

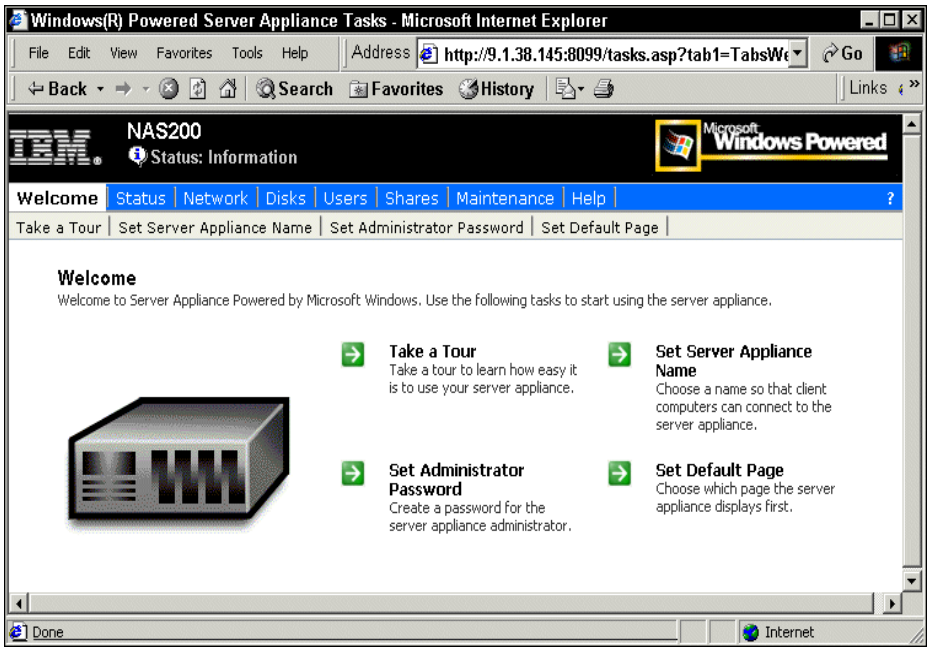

Windows(R) Powered Server Appliance Tasks - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address http://9.1.38.145:8099/tasks.asp?tab1=TabsW
Go
Back Search Favorites History
Links
NAS200
Status: Information
Microsoft Windows Powered
Welcome Status Network Disks Users Shares Maintenance Help
Take a Tour Set Server Appliance Name Set Administrator Password Set Default Page
Welcome
Welcome to Server Appliance Powered by Microsoft Windows. Use the following tasks to start using the server appliance.
Take a Tour
Take a tour to learn how easy it is to use your server appliance.
Set Server Appliance Name
Choose a name so that client computers can connect to the server appliance.
Set Administrator Password
Create a password for the server appliance administrator.
Set Default Page
Choose which page the server appliance displays first.
Done
Internet

*Figure 2-3 Microsoft Windows 2000 for NAS main screen*

4. From the main screen, select **Disks** (Figure 2-4).

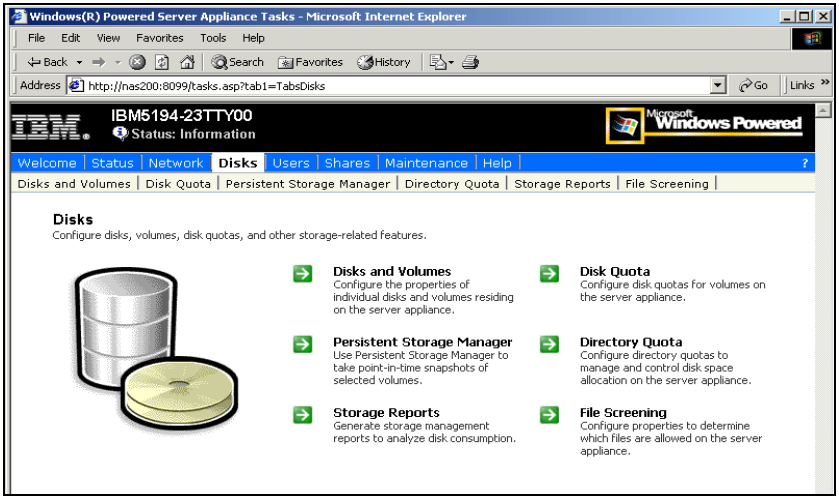

Windows(R) Powered Server Appliance Tasks - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://nas200:8099/tasks.asp?tab1=TabsDisks
Go
Links
IBM5194-23TTY00
Status: Information
Microsoft Windows Powered
Welcome Status Network Disks Users Shares Maintenance Help
Disks and Volumes Disk Quota Persistent Storage Manager Directory Quota Storage Reports File Screening
Disks
Configure disks, volumes, disk quotas, and other storage-related features.
Disks and Volumes
Configure the properties of individual disks and volumes residing on the server appliance.
Disk Quota
Configure disk quotas for volumes on the server appliance.
Persistent Storage Manager
Use Persistent Storage Manager to take point-in-time snapshots of selected volumes.
Directory Quota
Configure directory quotas to manage and control disk space allocation on the server appliance.
Storage Reports
Generate storage management reports to analyze disk consumption.
File Screening
Configure properties to determine which files are allowed on the server appliance.

*Figure 2-4 Disks screen*

5. Select **Persistent Storage Manager** and you will see Figure 2-5.

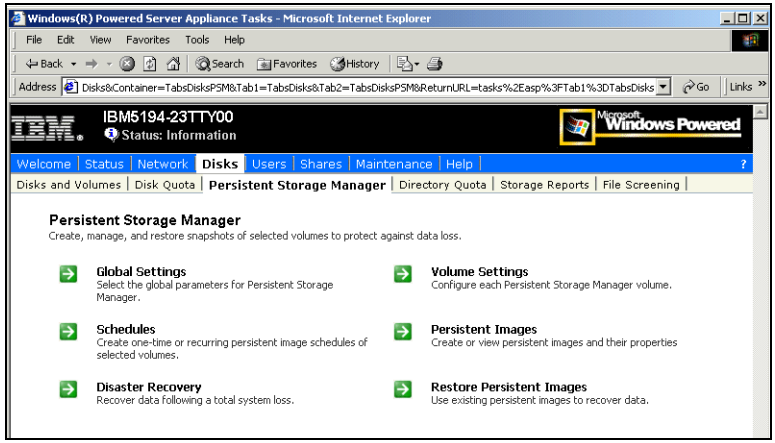

Windows(R) Powered Server Appliance Tasks - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address Disks&Container=TabsDisksPSM&Tab1=TabsDisks&Tab2=TabsDisksPSM&ReturnURL=tasks%2Easp%3FTab1%3DTabsDisks
Go Links
IBM5194-23TTY00
Status: Information
Microsoft Windows Powered
Welcome Status Network Disks Users Shares Maintenance Help
Disks and Volumes Disk Quota Persistent Storage Manager Directory Quota Storage Reports File Screening
Persistent Storage Manager
Create, manage, and restore snapshots of selected volumes to protect against data loss.
Global Settings
Select the global parameters for Persistent Storage Manager.
Volume Settings
Configure each Persistent Storage Manager volume.
Schedules
Create one-time or recurring persistent image schedules of selected volumes.
Persistent Images
Create or view persistent images and their properties
Disaster Recovery
Recover data following a total system loss.
Restore Persistent Images
Use existing persistent images to recover data.

*Figure 2-5 PSM main screen*

Now you are in the PSM main screen, ready to configure PSM.

## Configuring PSM

Before you create images, you need to configure PSM first. The following steps are intended to guide you through the PSM configuration:

1. Configure the Global settings. From the PSM main screen, click **Global Settings** (see Figure 2-6).

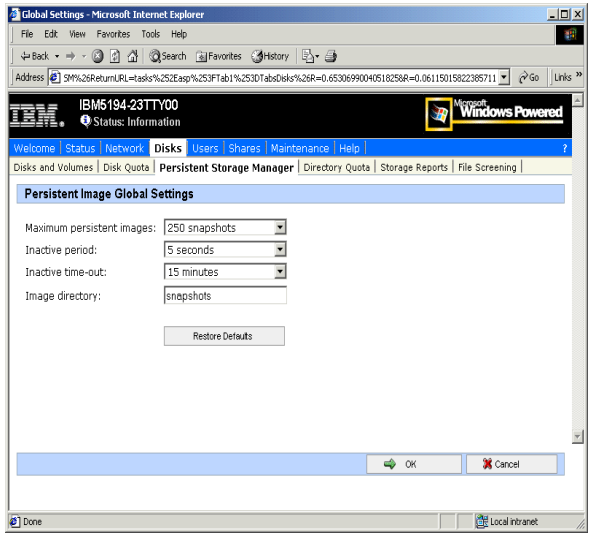



*Figure 2-6 PSM Global Settings screen*

This is where you can set the PSM Global Settings:

- **Maximum persistent images:**

  This corresponds to the maximum number of active images that you can create per volume.

  The default value is *250*.

- **Inactive period:**

  This is the idle time (on the volume) PSM will wait before creating a persistent image.

  The default value is *5 seconds*.

- **Inactive time-out:**

  This is the time that PSM will wait for inactivity. If the Inactive period (for example, 5 seconds) does not occur within the specified Inactive time-out (for example, 15 minutes), PSM will not create a persistent image.

  The default value is *15 minutes*.

- **Persistent image directory name:**

  This is the name of the directory that will contain the image of your volume. The default here is “snapshot”, but you can change it to any name you want.

  The default directory is *snapshot*.

When finished, click **OK** to get back to the PSM main screen.

2. Configuring the Volume settings. Click **Volume Settings:**

   This is where you can configure the specific volume attributes (see Figure 2-7).

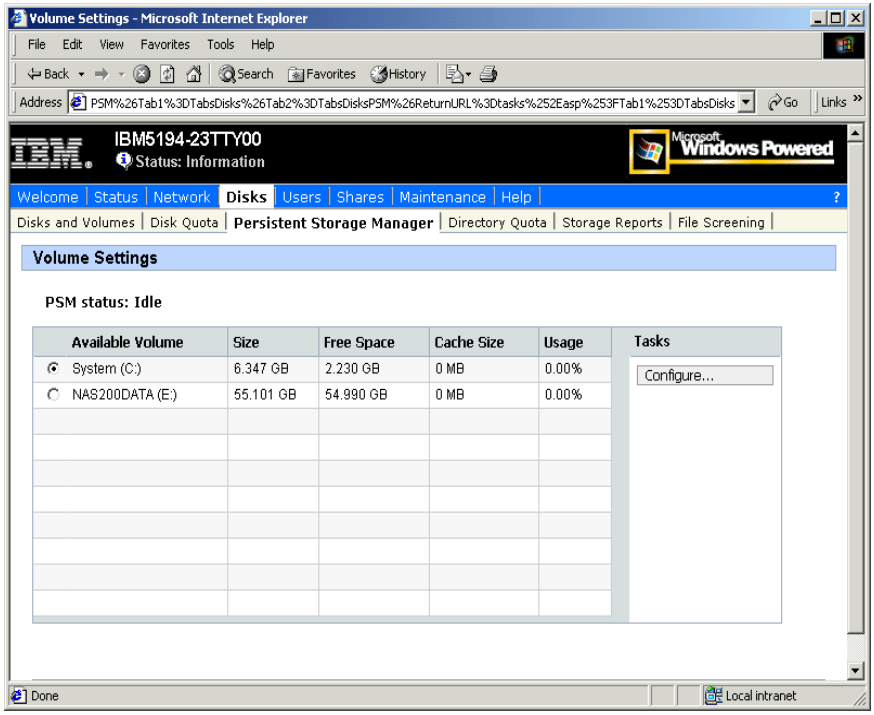

Volume Settings - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address PSM%26Tab1%3DTabsDisks%26Tab2%3DTabsDisksPSM%26ReturnURL%3Dtasks%252Easp%253FTab1%253DTabsDisks
Go Links
IBM5194-23TTY00
Status: Information
Microsoft Windows Powered
Welcome Status Network Disks Users Shares Maintenance Help ?
Disks and Volumes Disk Quota Persistent Storage Manager Directory Quota Storage Reports File Screening
Volume Settings
PSM status: Idle
Available Volume Size Free Space Cache Size Usage Tasks
System (C:) 6.347 GB 2.230 GB 0 MB 0.00%
NAS200DATA (E:) 55.101 GB 54.990 GB 0 MB 0.00%
Configure...
Done
Local intranet

*Figure 2-7 PSM Volume Settings screen*

You can select a volume and configure the specific attributes by clicking **Configure** (See Figure 2-8).

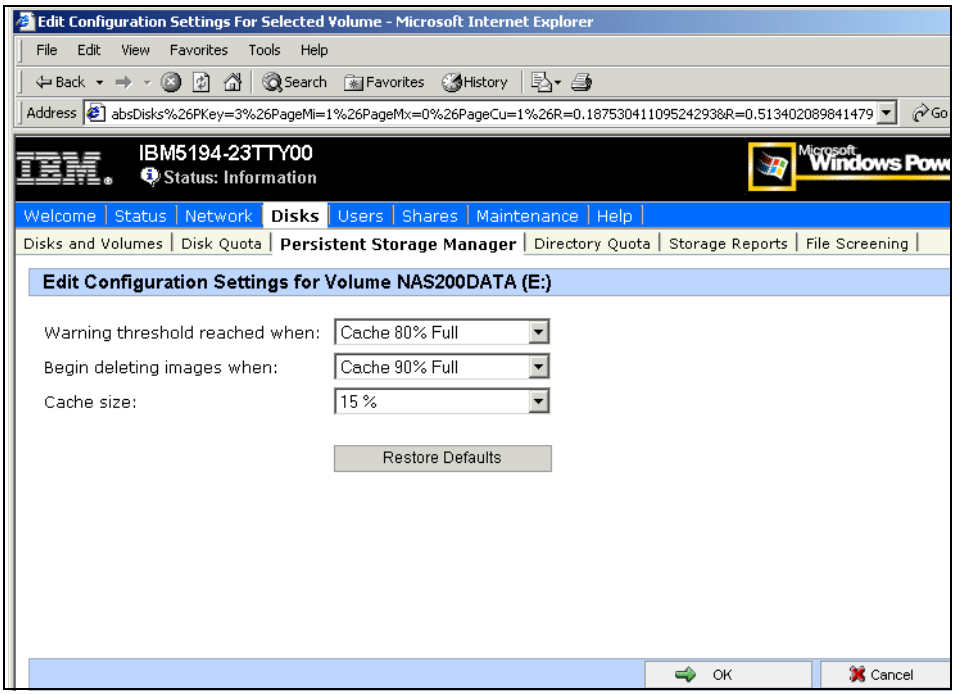

Edit Configuration Settings For Selected Volume - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address absDisks%26PKey=3%26PageMi=1%26PageMx=0%26PageCu=1%26R=0.18753041109524293&R=0.513402089841479
Go
IBM
IBM5194-23TTY00
Status: Information
Microsoft Windows Pow
Welcome Status Network Disks Users Shares Maintenance Help
Disks and Volumes Disk Quota Persistent Storage Manager Directory Quota Storage Reports File Screening
Edit Configuration Settings for Volume NAS200DATA (E:)
Warning threshold reached when: Cache 80% Full
Begin deleting images when: Cache 90% Full
Cache size: 15 %
Restore Defaults
OK
Cancel

*Figure 2-8 PSM attributes of a volume*

– **Warning threshold:**

  This is the percentage of the cache size before warnings are sent. This is done to inform the NAS administrator that it is time to save the images before unwanted deletion of the first persistent images occurs. The logs for this option are saved in the Windows Event Log, so you can check for it using either Internet Explorer or a Terminal Services Client.

  The default value is *Cache 80% Full*.

– **Begin deleting images:**

  This is the percentage of cache size that, if reached, will begin deleting images on first in first out basis

  The default value is *Cache 90% Full*.

– **Cache size:**

This is the size of the PSM cache allocated from the PSM volume location. Is expressed in a percentage of the volume size. Make sure that you have enough space in you volume to hold the cache file.

The default value is *15%*.

Click **OK** to get back to the Volume settings screen, and click **Back** to come back to the PSM main screen.

## Creating a PSM image

You have two options for creating a PSM image:

- Immediate
- Scheduled

### *Creating an immediate PSM image*

We start by showing the steps to create an immediate PSM image:

1. At the PSM main screen (see Figure 2-5 on page 21), click **Persistent Images**. You will see the screen in Figure 2-9 that contains the already-created images.

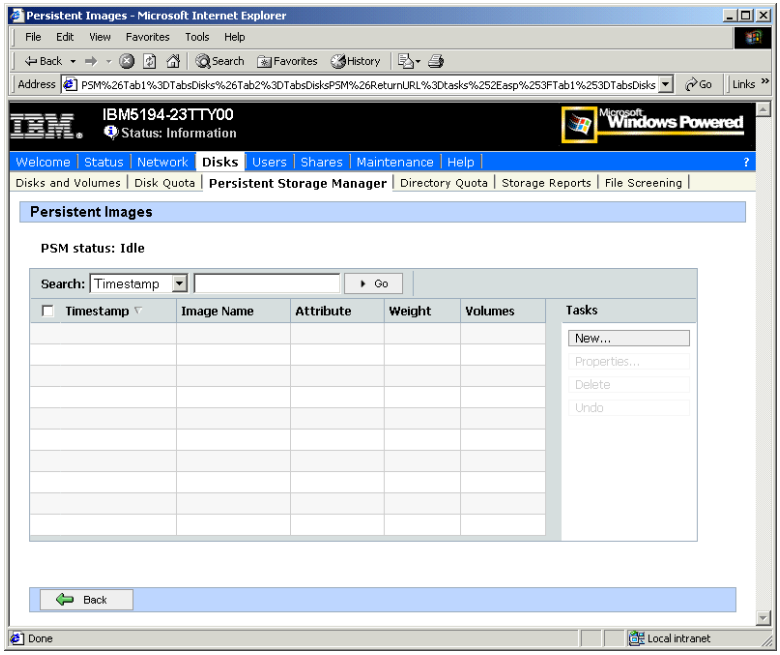



*Figure 2-9 PSM Screen containing already-created images*

2. Click **New** to see the Create Image screen (see Figure 2-10).

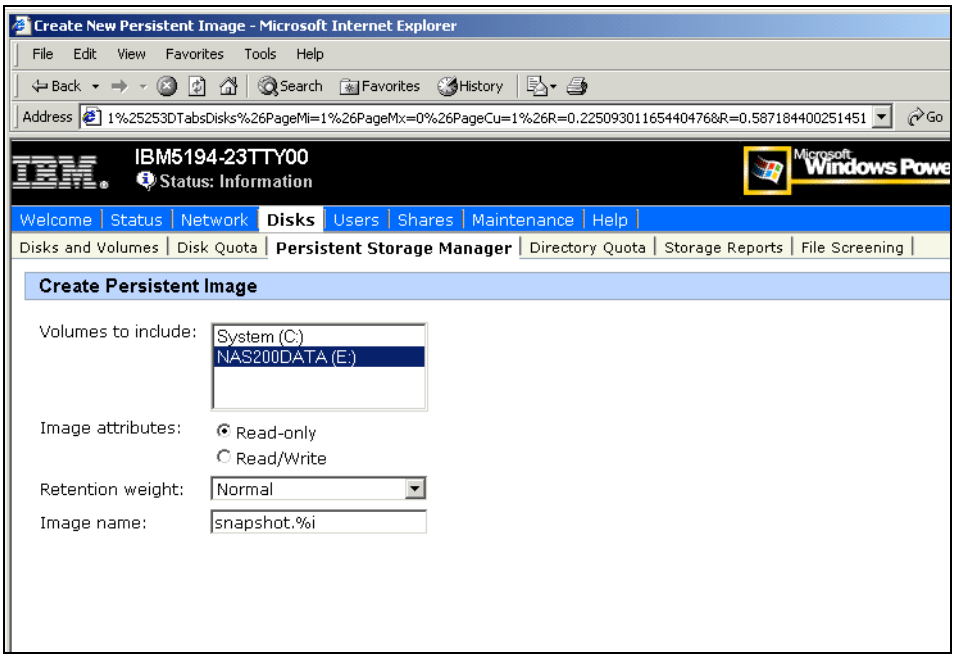



*Figure 2-10 Create Image screen*

3. In the *Volumes to Include:*, select the drives that you want to create an image of. For multiple volumes, press the Ctrl or Shift key while selecting the drives you want to have PSM images created of.
4. You can choose if the image has read-only attributes, or if it is read/write.
5. You can also give the image a relative retention weight and a name. The retention weight is important when PSM needs to delete some persistent images of a volume because the cache file for the volume has reached a certain threshold.
6. Click **OK**. You will be taken to the Persistent Image List window showing the volumes.

**Note:** After PSM images are created, you might have to wait for a few seconds or minutes in order for PSM to update its write-back queues and caches. In particular, the very first image will generally take much longer than subsequent images. Hence, if the system is heavily utilized, this update may take a while. After this, you should be able to access the images. One other thing to keep in mind is that — by design — PSM will run at a lower priority than regular I/O.

7. After a while, click the **Refresh** icon on your Internet Explorer. You should now see the new images you created on the list (Figure 2-11). You can change the properties, undo changes made to the image or delete the image using this screen.

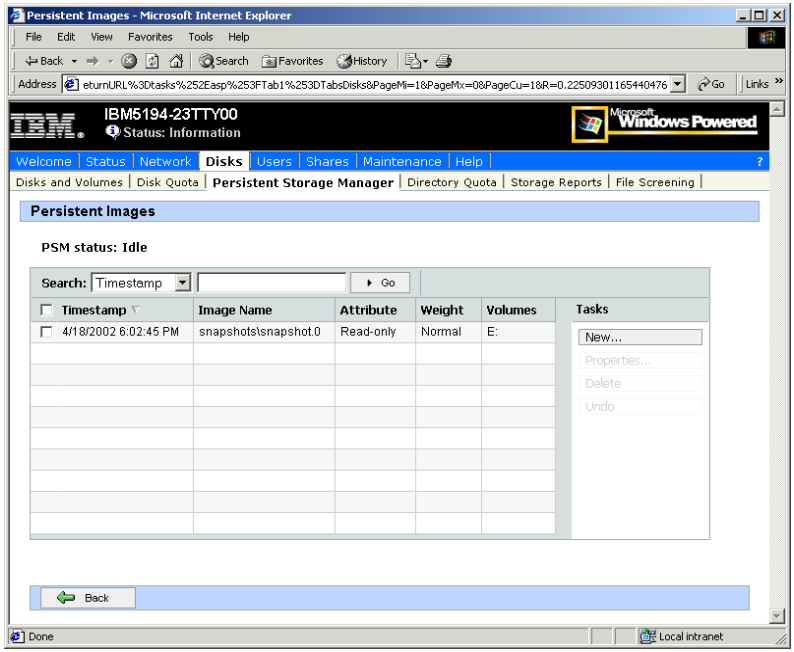



*Figure 2-11 Persistent Image List screen*

8. To check if the images contain exactly the same data as the volumes you selected, logon to the NAS using Terminal Services Client from the Maintenance menu on your Web Browser (or do it locally).
9. After that, open a Windows Explorer window.

   As shown in Figure 2-12, a *snapshot* directory has been created on each volume (E:) that was selected during the image creation. The mounted volumes in turn contain the directories (and files) that were in each volume at the time you created the images.

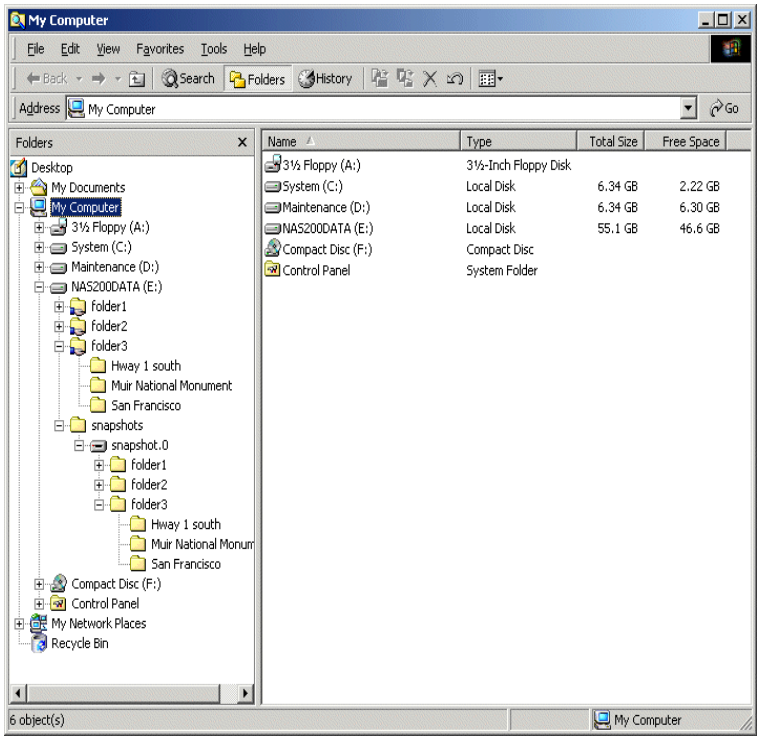



*Figure 2-12 Screen showing the image created*

### *Creating scheduled PSM images*

An automated version of creating a PSM image is also available. You can schedule your job tasks so that those actions can take place during the night and after business hours. The following steps demonstrate how to create a scheduled PSM image:

1. From the PSM main screen, select **Schedules** (Figure 2-5 on page 21).
2. On the Persistent Image Schedules screen, click **New**.
3. On the Create Persistent Image Schedules screen (Figure 2-13), select the entries for the following by clicking the pull-down arrow.
   - **Start at:**
   - **Repeat Every:**
   - **Begin:**
   - **Volumes to Include:**
   - **Image Attributes:**
   - **Retention Weight:**
   - **Number of images to save:**
   - **Image name:**

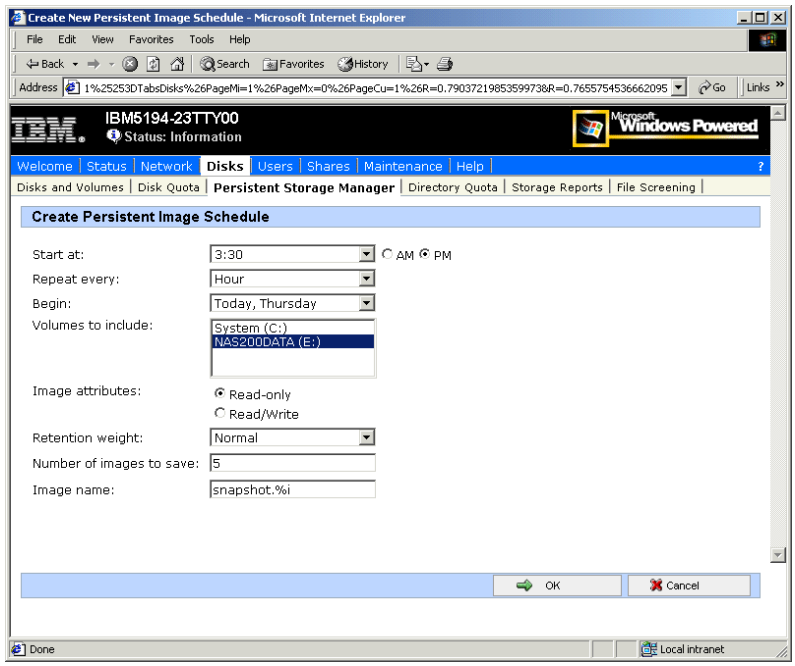

Create New Persistent Image Schedule - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address 1%25253DTabsDisks%26PageMi=1%26PageMx=0%26PageCu=1%26R=0.79037219853599738R=0.7655754536662095
Go Links
IBM5194-23TTY00
Status: Information
Microsoft Windows Powered
Welcome Status Network Disks Users Shares Maintenance Help
Disks and Volumes Disk Quota Persistent Storage Manager Directory Quota Storage Reports File Screening
Create Persistent Image Schedule
Start at: 3:30 AM PM
Repeat every: Hour
Begin: Today, Thursday
Volumes to include: System (C:) NAS200DATA (E:)
Image attributes: Read-only Read/Write
Retention weight: Normal
Number of images to save: 5
Image name: snapshot.%i
OK Cancel
Done
Local intranet

*Figure 2-13 Screen for creating a new scheduled persistent image*

4. Click **OK**.
5. You will reach the Scheduled Persistent Images window showing the volumes, time and date, and repetition you selected earlier (Figure 2-14). In this screen you can also change the properties of the scheduled Image, or delete it.

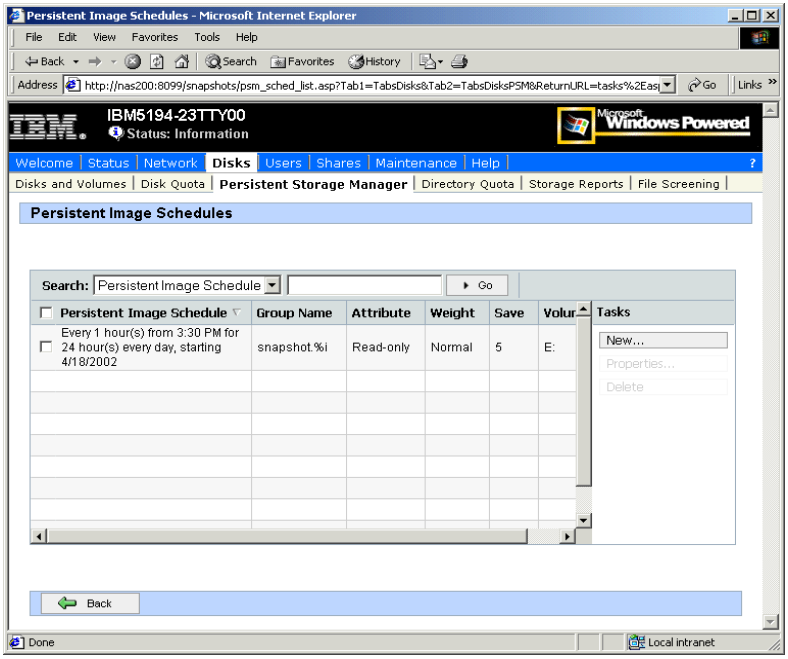



*Figure 2-14 Screen showing scheduled persistent images*

## Restoring a Persistent Image

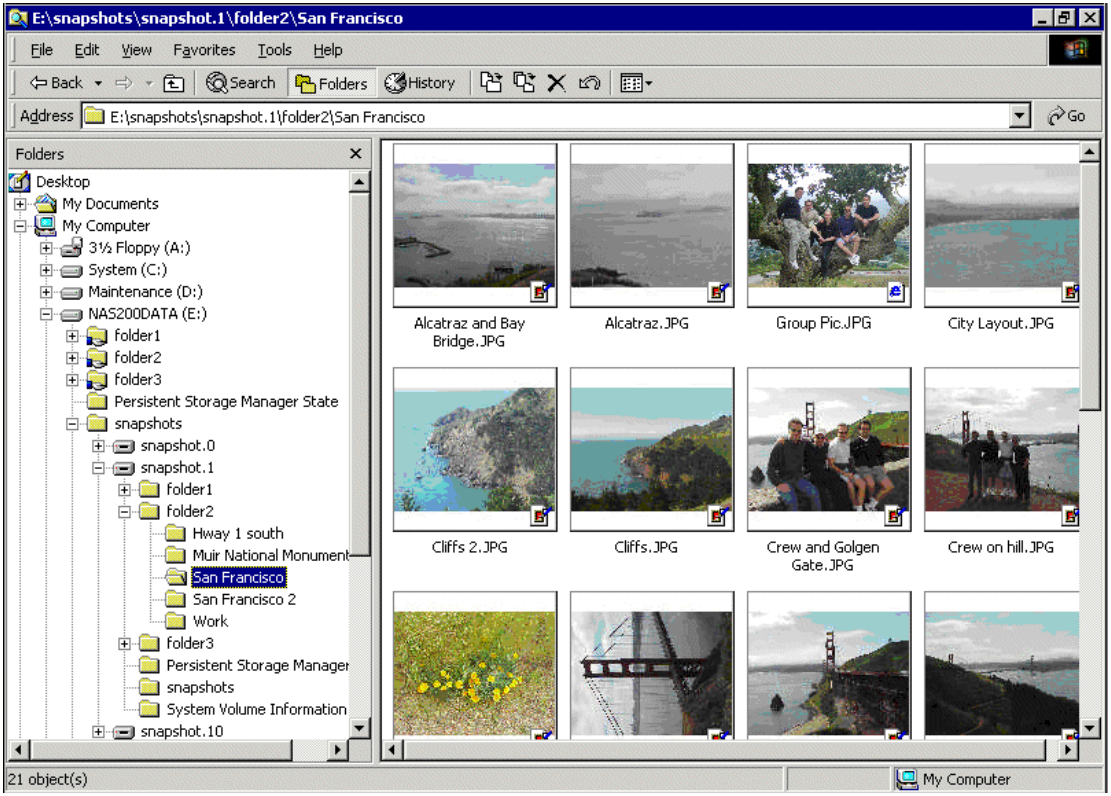
If you need to use the information stored in an image, you have two choices:

- File system access
- Restore the complete image

### *File Systems Access*

You can access the files stored in the Persistent Images just as any other file in your system. See Figure 2-1.

- Open the Windows Explorer.
- Go to the Persistent Images directory (*snapshot* in our example).
- Choose the image you want to use (*snapshot.1* in our example).
- Choose and work with the file as usual, browsing with the Windows Explorer and finding the file.
- You can now:
  - Drag and drop the file on to the volume to replace the actual file.
  - Edit the file directly, if the image was created read/write.
  - Edit the file after copying it to the volume, if the image was created read-only.




*Example 2-1 Using files in a Persistent Image*

### *Restore the complete image*

You restore the complete volume image by clicking Restore Persistent Images in the PSM main screen.

In the Persistent Images to Restore Screen, you can choose the Image to be restored (see Figure 2-15):

- Select the Image you want to restore.
- Click **Details** to see more information.
- Click **Restore** to restore the image.

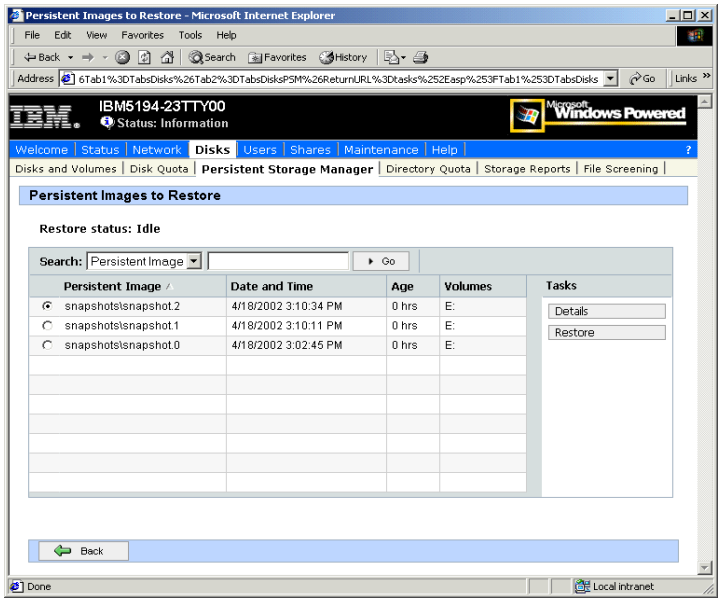



*Figure 2-15 Choose the Persistent Image to restore.*

- Click **OK** in the confirmation screen.

Now you have successfully restored the Persistent Image.

## Disaster Recovery with PSM

In the event that you need to recover the operating system volume from the Recovery CD, all systems settings have to be recreated. PSM provides a procedure for backing up the system partition in a network share or local disk. This procedure also creates a boot diskette to boot the machine, and recovers the system partition from the image (unattended).

To start the process, click **Disaster Recovery** in the PSM main screen. You are now in the Disaster Recovery screen (see Figure 2-16). This is an informative screen with the current status of the disaster recovery tool. You can start an immediate backup, create a boot diskette, or configure the properties.

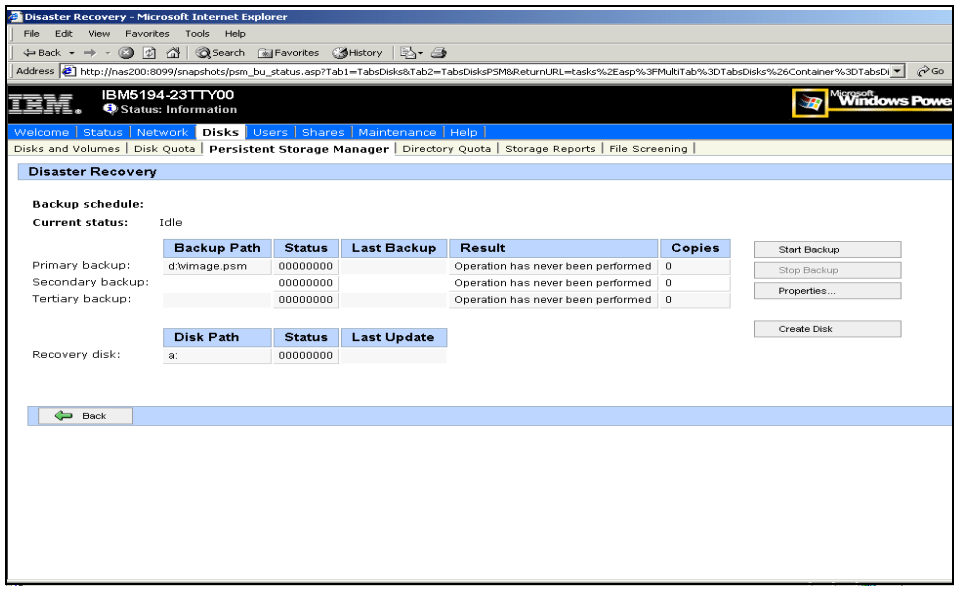

Disaster Recovery - Microsoft Internet Explorer
IBM5194-23TTY00
Status: Information
Welcome | Status | Network | Disks | Users | Shares | Maintenance | Help
Disks and Volumes | Disk Quota | Persistent Storage Manager | Directory Quota | Storage Reports | File Screening
Disaster Recovery
Backup schedule:
Current status: Idle
Backup Path | Status | Last Backup | Result | Copies
Primary backup: d:\vimage.psm 00000000 Operation has never been performed 0
Secondary backup: 00000000 Operation has never been performed 0
Tertiary backup: 00000000 Operation has never been performed 0
Start Backup
Stop Backup
Properties...
Create Disk
Disk Path | Status | Last Update
Recovery disk: a: 00000000
Back

*Figure 2-16 PSM Disaster Recovery screen*

Click **Properties** to configure the settings. Now you are in the PSM Disaster Recovery Properties screen, as shown in Figure 2-17.

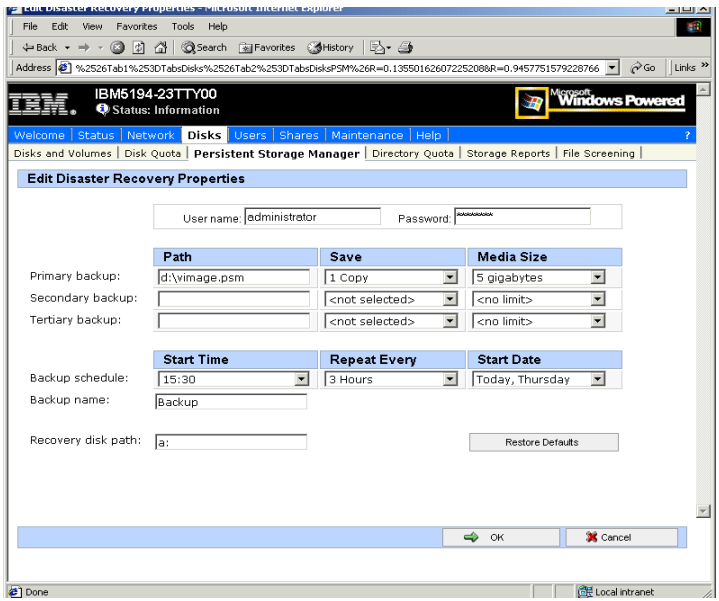



*Figure 2-17 PSM Disaster Recovery Properties screen*

Now you can provide the needed parameters, such as:

- Location of backup (up to three sites, including network shares)
- Number of copies for each site
- Size limit for each site
- Settings for scheduling the command
- Backup name
- Username and password that attaches to the network shares during a system backup or disaster recovery

You can click **OK** and come back to the PSM Disaster Recovery screen.

- Click **Start** to start the backup.
- Click **OK** again in the confirmation screen.

You can monitor the progress of the image creation in the PSM Disaster Recovery screen, as shown in Figure 2-18.

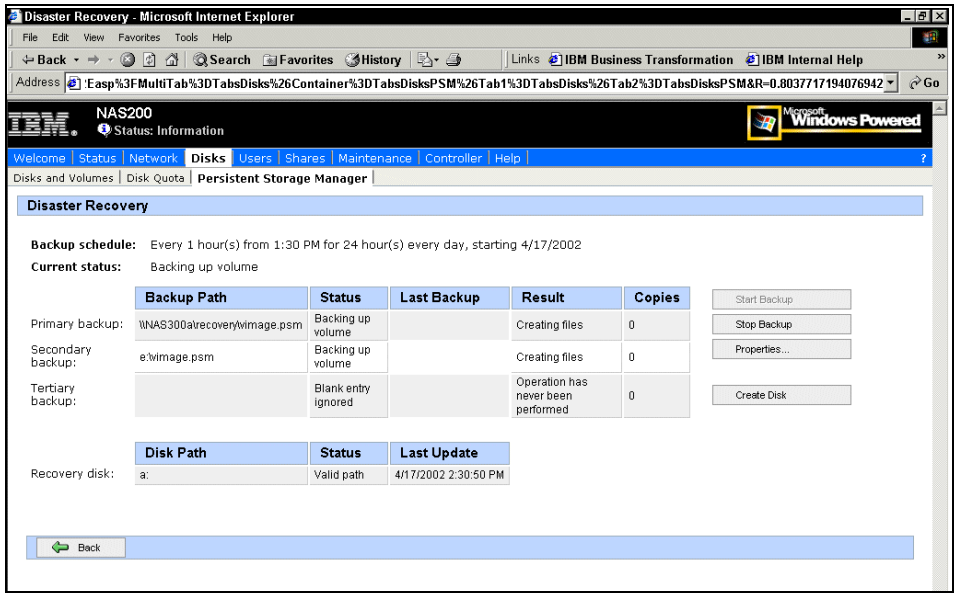



*Figure 2-18 Backing up Disaster Recovery Image*

When the image is copied, you can see the results in the PSM Disaster Recovery screen in Figure 2-19.

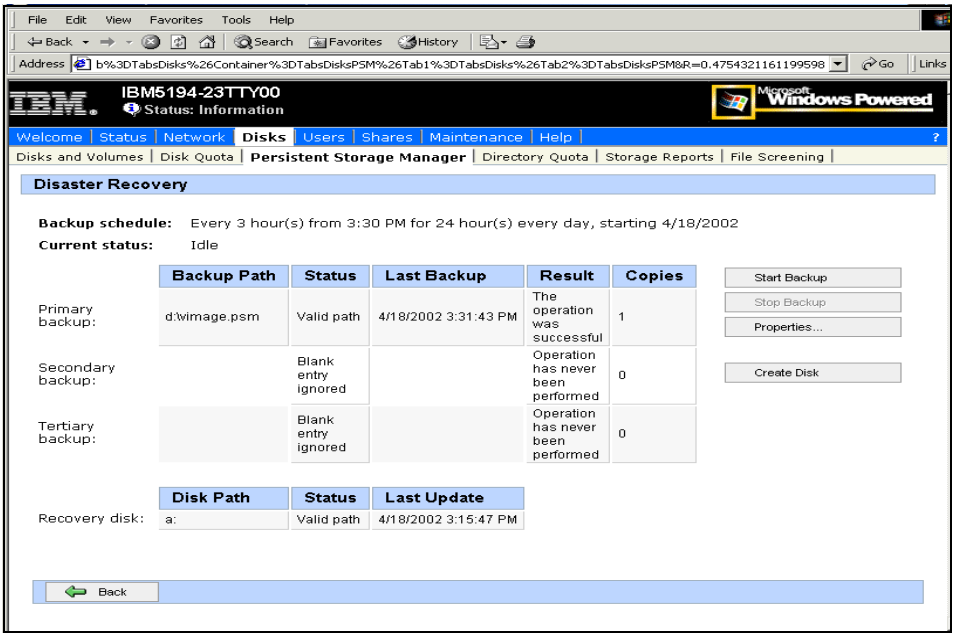

File Edit View Favorites Tools Help
Back Search Favorites History
Address b%3DTabsDisks%26Container%3DTabsDisksPSM%26Tab1%3DTabsDisks%26Tab2%3DTabsDisksPSM&R=0.4754321161199598
Go Links
IBM5194-23TTY00
Status: Information
Microsoft Windows Powered
Welcome Status Network Disks Users Shares Maintenance Help
Disks and Volumes Disk Quota Persistent Storage Manager Directory Quota Storage Reports File Screening
Disaster Recovery
Backup schedule: Every 3 hour(s) from 3:30 PM for 24 hour(s) every day, starting 4/18/2002
Current status: Idle
Backup Path Status Last Backup Result Copies
Primary backup: d:\vimage.psm Valid path 4/18/2002 3:31:43 PM The operation was successful 1
Secondary backup: Blank entry ignored Operation has never been performed 0
Tertiary backup: Blank entry ignored Operation has never been performed 0
Start Backup
Stop Backup
Properties...
Create Disk
Disk Path Status Last Update
Recovery disk: a: Valid path 4/18/2002 3:15:47 PM
Back

*Figure 2-19 PSM Disaster Recovery Image created*

You should now create the boot disk.

- Insert a formatted floppy disk in the diskette drive of the NAS device.
- Click **Create Disk** in the PSM Disaster Recovery screen.
- Click **OK** in the confirmation screen. This can take some time.
- When finished, click **Back** to get back to the PSM Disaster Recovery screen.
- To make the disk bootable, run the **`fixboot.bat`** file on the floppy disk.

The process to recover the system volume from a disaster recovery image is straightforward. Just boot the NAS appliance with the boot diskette inserted. The recovery process starts automatically and will try the first given path that contains a valid image and load it. After that you only have to reboot the machine.

**Restriction:** Restoration of a PSM backup image over the network is not supported for the Gigabit Ethernet Adapter. If you have only Gigabit Ethernet adapters installed, it is recommended that you perform PSM backup of each node to its maintenance partition (D: drive), which would allow you to recover if the system volume is corrupt and/or unbootable.

### 2.1.3 Special considerations for PSM in a clustered environment

In this section we review some special considerations to take in account when PSM is used in a clustered environment like in the IBM TotalStorage NAS 300.

The use of PSM in clustered volumes is supported, and there are no big differences with PSM standard volumes, as explained in 2.1.2, “Creating images with PSM” on page 19. However, the following points deserve mention:

- Creating and accessing a snapshot is the same procedure as for unclustered systems.
- When failing over a disk from one node (or after a failure), the other node mounts the volume and all the snapshots in the volume. After that, the snapshots are accessible via the other node.
- After a failover, there is a delay between the moment the volume is accessible until the snapshots are accessible that vary depending on the number and size of the snapshots.
- In the event of a failover, PSM has to load the images before the volume can be brought online on the node. The default time-out for pending state in a cluster is 180 seconds. It is recommended to change this value to a greater one to avoid that the disk is set off-line, and not accessible for either node.

  This is done by opening the **IBM NAS Admin Tool —> Cluster Tool —> Cluster Administrator**. Select a group with clustered disks and in the right panel you see all the resources for this group. For each resource listed, do the following:

  – Right-click the resource name and select **Properties**.
  – Select the **Advanced** tab.
  – Change the **Pending timeout** value to 1200 (seconds).
  – Click **Apply**, then click **OK**.
  – Repeat for all groups with clustered disks.
- Scheduling a Persistent Image is always done on one of the nodes. If the disk is moved to the other node, the image is not created and an error message is generated, as shown in Figure 2-20.

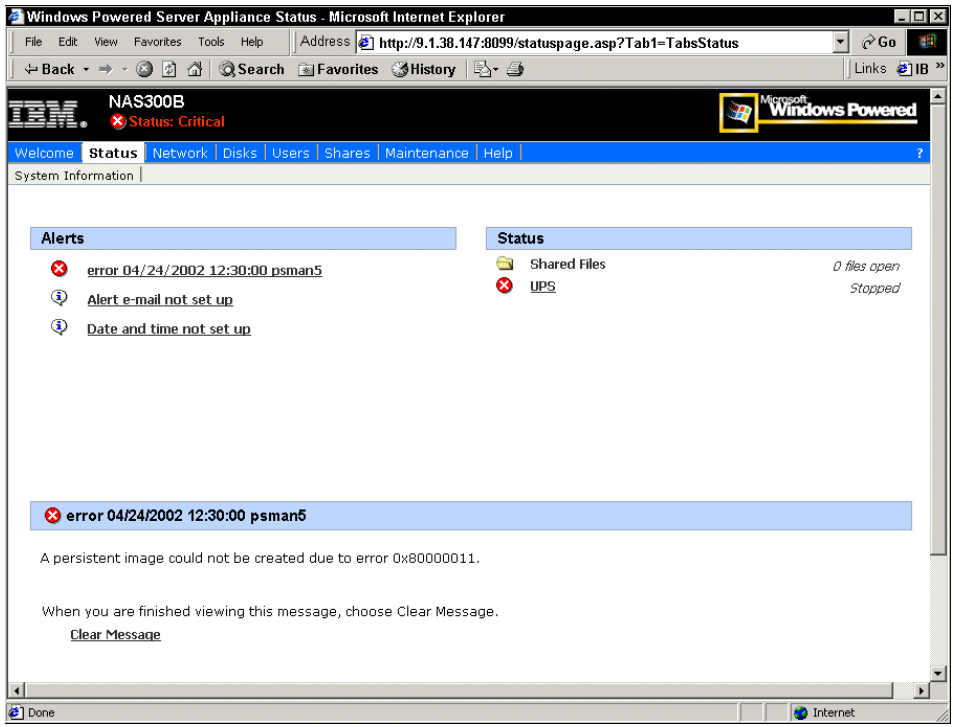



*Figure 2-20 PSM error when failing over a disk*

**Tip:** If you want to assure that the image is created no matter which node owns the disk, configure the scheduled images on both nodes. Now you are sure that the image is generated on one node and that the error message is generated on the other one.

## 2.2 Using PSM with backup software solutions

For systems that need to be available 24 hours per day and 7 days per week (24x7), backup is a challenge. Traditionally, it is required to shut down the application and to close any open files before performing a backup, to ensure data integrity. However, if a significant amount of data is involved, backup may take a while, especially when the transfer is directed to tape. This amount of downtime may not be acceptable for most systems, for various reasons, such as delayed transactions or lost profit.

By using PSM, there is no need to shut down the application, because of its capability to capture snapshots, even with open files. In combination with a backup solution, systems that store data on NAS devices can now operate in 24x7 mode.

For more information on using PSM, IBMSNAP, and backup software, see the following chapters:

- Chapter 3, “Microsoft Windows NT Backup” on page 51
- Chapter 4, “Tivoli Storage Manager (TSM)” on page 67

### 2.2.1 IBMSNAP Utility

To provide flexibility for your existing backup solution, persistent image functionality is implemented in such a way that any backup application that supports command line backups will be supported.

The IBM NAS systems come with a command line utility called *IBMSNAP.EXE* that allows you to use PSM technology with your existing backup software solution. Usage of this utility requires knowledge of Windows batch file processing plus the backup software command line utility. *IBMSNAP.EXE* is a command line utility that creates a PSM image, launches the backup batch file, and then sets the archive bits accordingly on the drive being backed up.

The *IBMSNAP.EXE* file is located in the *C:\ibm\NASBackup* directory.

Usage of *IBMSNAP.EXE*:

```
ibmsnap /l:{drive} /files:{backup_script_file} /exit
```

Where:

*{drive}* = volume you want to have a PSM image of

*{backup_script_file}* = script or batch file that PSM runs after creating image

/exit = exit and close PSM

## 2.3 Replication using NSI Double-Take

This section will describe NSI Double-Take and its features. It will show how to install, set up, and use Double-Take on NAS systems. Double Take can be configured in many different ways to meet your data protection and availability plans. The following section covers the replication configuration based on two servers.

## 2.3.1 Description of Double-Take

Double-Take is a real-time software product that can be used for increased data availability through failover and replication of the data. By minimizing downtime and data loss, Double-Take is one more tool in your data protection arsenal, and it accomplishes this with only a small amount of impact on existing communications and network resources.

Double-Take allows the user to select specific volumes and directories to replicate, in real-time, from a source server to a target server. The target server(s) can be local or remote, giving the user the ability to have off-site backups in real-time. It has the ability to move only changes in data allowing minimal impact on resources.source. There are many ways to implement Double-Take in a data protection environment including:

- Local data replication services
- Off-site data replication services

## 2.3.2 Double-Take features

Double-Take has many features which can help you to create an improved data protection environment. These features include: high availability and disaster recovery management features, resource utilization features, multi-platform features, and improved backup benefits.

- **High availability and disaster recovery management features:**
  - Continuous replication lowering your environment's exposure to data loss by real-time replication of file changes to target system.
  - Failover capability which may reduce system downtime enabling businesses to continue to function.
  - Multiple configuration options which include a one-to-one, many-to-one, one-to-many, and others across any IP based LAN or WAN.
  - Ability to configure a many-to-one disaster recovery plan which may allow for reduced total cost of ownership.
  - Options which allow reporting and verification of data protection systems.
- **Resource utilization features:**
  - Selective file replication allowing you to choose the specific directories and drives that require replication saving on valuable bandwidth.
  - File update technology which only transmits file updates, not whole disk blocks or whole files. This may lower the bandwidth requirement and allow for more efficient use of resources.
  - Double-Take can operate in an asynchronous mode allowing processing to continue even in a congested link environment.

- **Multi-platform features:**
  - Multi-platform consistency provides identical functionality on Windows 2000/NT and Solaris platforms. This allows for simplification of training and support. Single management of both platforms may allow for lower Total Cost of Ownership. Double-Take can be used on the following operating systems:
    - Windows 2000 and Windows NT 4.0
    - Solaris 2.51, 2.6, 7, and 8
    - Improved backup benefits
  - Double-Take allows for mirroring of open files, eliminating the need to schedule system downtime for complete backups.

### 2.3.3 Double-Take operations

Double-Take performs four basic types of operations: mirroring, replication, failure monitoring/failover, and restoration.

- **Mirroring:** The process of creating an identical copy of data from the source system to the target system. File attributes and permissions are retained. After initial mirroring, only subsequent changes to files are updated and transferred.
- **Replication:** This is the real-time transmission of file changes from source to target. Double-Take's replication process operates at the file system level and can independently track file changes from the file's related application.
- **Failure monitoring/failover:** This setup allows for the a target system to stand in for a failed source system. This results in user and application requests being redirected to the target machine. Failover can be automatic or manual depending on the configuration.
- **Restoration:** Restoration is an easy way to replicate data back from target system to source system. This can be accomplished with specific data or the whole replication set. Double-Take provides a method for this with minimal configuration.

### 2.3.4 Double-Take installation

Please install Double-Take according to the manufacturer's recommendations.

## 2.3.5 Setting up Double-Take

Setting up Double-Take is fairly straightforward. After you have installed Double-Take, start the application with the Double-Take Management Console. You will see a list of all the machines that have the Double-Take software installed. This is shown in Figure 2-21.

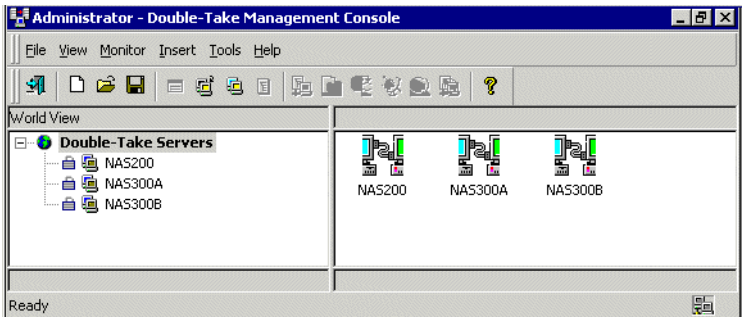



*Figure 2-21 Double-Take — Server List*

Valid activation codes are now required to enable the Double-Take software. This is done by logging into each machine, either by right-clicking each server listed and choosing **Logon**, or by double-clicking the appropriate server. You supply a username and password as shown in Figure 2-22.

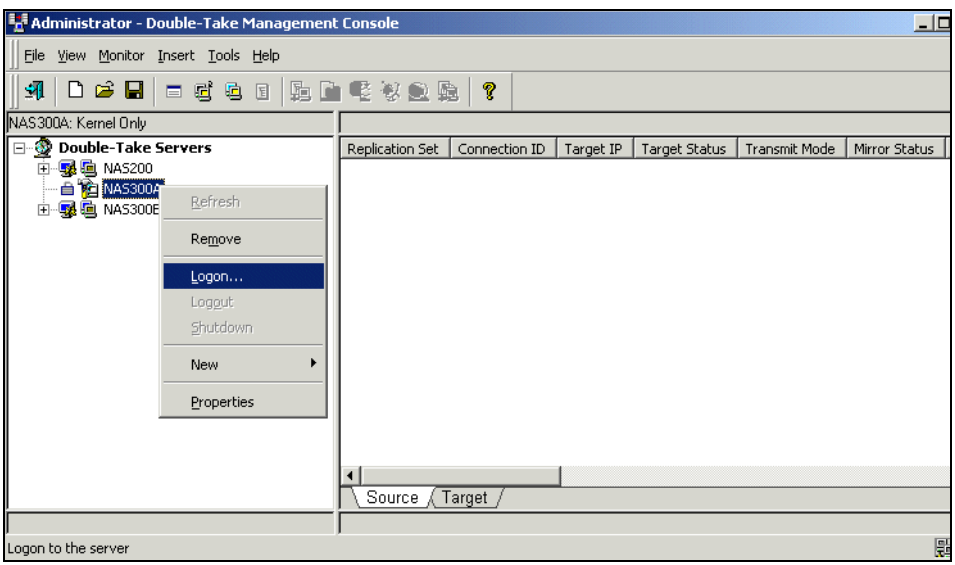



*Figure 2-22 Double-Take — Logon to Server*

Once you have logged on, you will get a message stating that you need to supply a valid activation code to enable Double-Take. This is shown in Figure 2-23.

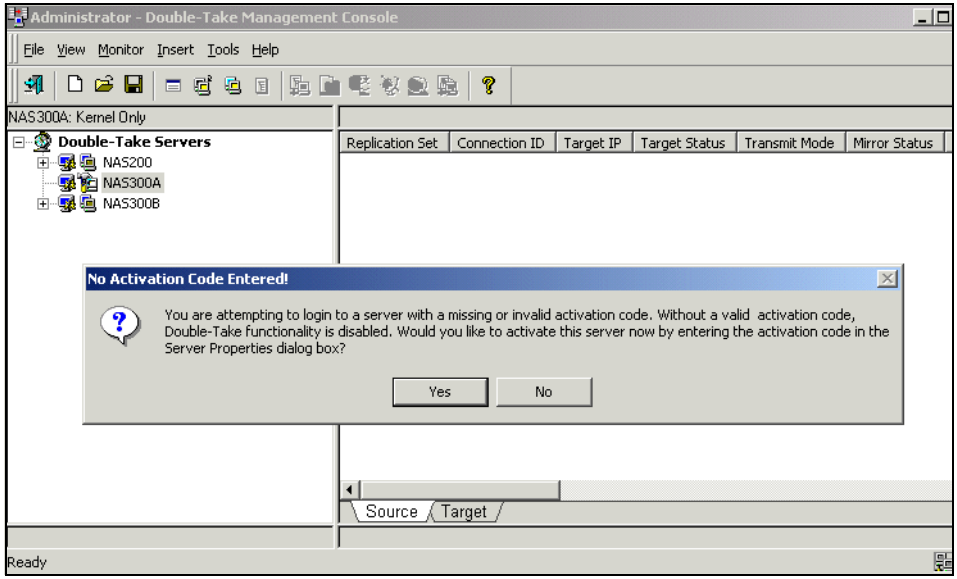

Administrator - Double-Take Management Console
File View Monitor Insert Tools Help
NAS300A: Kernel Only
Double-Take Servers
NAS200
NAS300A
NAS300B
Replication Set
Connection ID
Target IP
Target Status
Transmit Mode
Mirror Status
No Activation Code Entered!
You are attempting to login to a server with a missing or invalid activation code. Without a valid activation code, Double-Take functionality is disabled. Would you like to activate this server now by entering the activation code in the Server Properties dialog box?
Yes
No
Source
Target
Ready

*Figure 2-23 Double-Take — No Activation Code Entered*

At this time you will need to decide on the role of the system. Is the NAS appliance going to serve as a source, or a target, or both? If you choose not to select a box, or only one of the boxes, you can always go back in later and change the settings. Select the appropriate check boxes and type in the activation code as shown in Figure 2-24. Click **OK** to continue.

**Tip:** Deselecting a check box may cause one of your replication sets to stop working if that server is part of a current replication set.

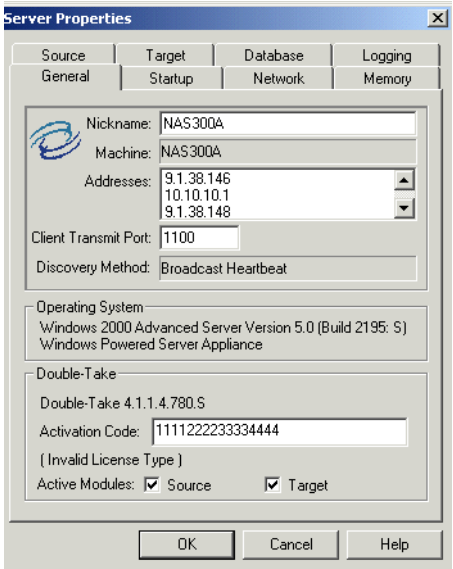



*Figure 2-24 Double-Take — Activation Code Server Properties Window*

Once you have entered a valid activation code for each system, double-clicking any server in the Double-Take Servers list will show all the available drives under each corresponding server. Now you are ready to start using Double-Take.

If, however, you had entered a valid activation code but did not check either the Source or Target boxes, your server will show up in the list, but no drives will show if you double-click that server. If this is the case, simply right-click the appropriate server and chose properties from the menu. Make the necessary changes and click **OK** to continue.

## 2.3.6 Creating a mirror

Double-Take performs four basic types of operations: mirroring, replication, failure monitoring/failover, and restoration. We will now demonstrate how to create a mirror between two servers.

The first step in mirroring is to decide which machine is going to be the source and which is going to be the target. Once you have decided this, you can bring up the connection wizard by clicking the **Tools** menu and selecting **Connection Wizard**. This can be seen in Figure 2-25.

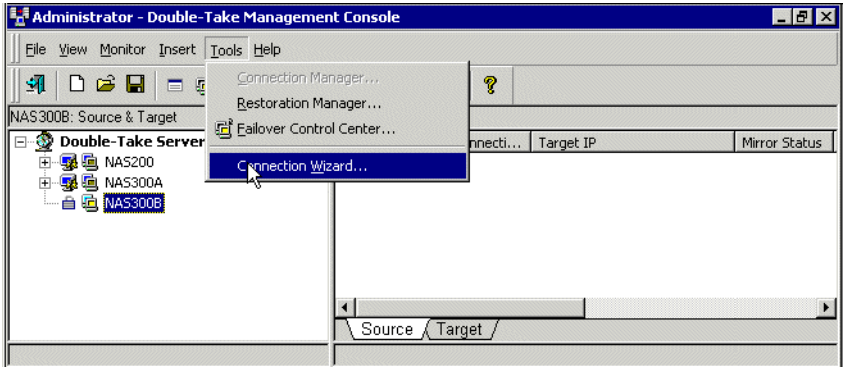



*Figure 2-25 Double-Take — Connection Wizard*

You may also access the wizard by dragging the source machine onto the target machine. Either way will bring up the Double-Take Connection Wizard welcome screen as shown in Figure 2-26.

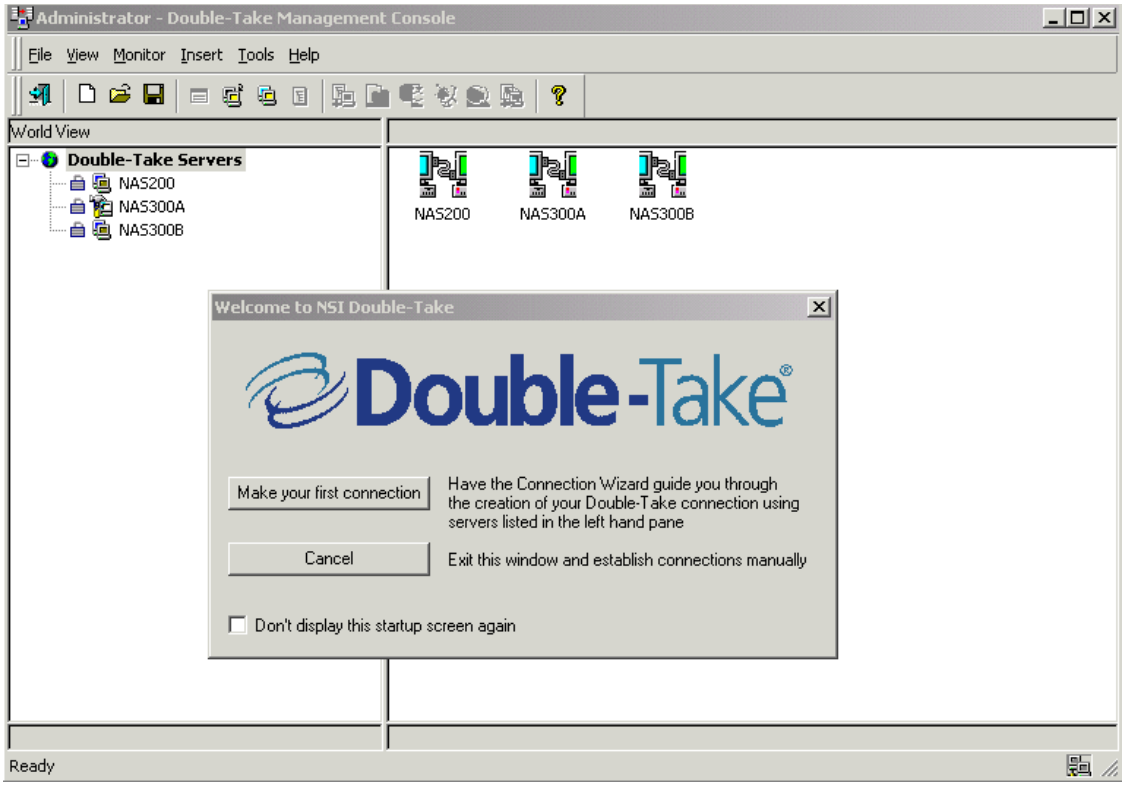

Administrator - Double-Take Management Console
File View Monitor Insert Tools Help
World View
Double-Take Servers
NAS200
NAS300A
NAS300B
Welcome to NSI Double-Take
Double-Take
Make your first connection
Have the Connection Wizard guide you through the creation of your Double-Take connection using servers listed in the left hand pane
Cancel
Exit this window and establish connections manually
Don't display this startup screen again
Ready

*Figure 2-26 Double-Take — Connection Wizard*

The connection wizard will take you through the process of setting up a connection with a source and target system. Click the **Make your First Connection** button and follow the wizard through the process of creating a connection between two NAS appliances.

The wizard tells you that it will take you through the basic steps of setting up a connection. It asks you what system is going to be the one with the information that needs to be protected, which will be the source device. All the systems that have Double-Take software loaded, have a valid activation code installed, and you had checked to be a source will show up here. Use the drop-down box to select the appropriate NAS appliance and click **Next** as shown in Figure 2-27.

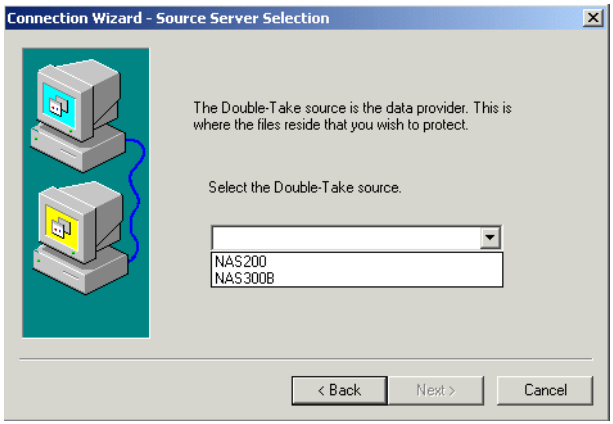

Connection Wizard - Source Server Selection
The Double-Take source is the data provider. This is where the files reside that you wish to protect.
Select the Double-Take source.
NAS200
NAS300B
< Back
Next >
Cancel

*Figure 2-27 Double-Take — Choosing Source System*

The wizard then asks for the target machine, which will be receiving the data. Again, the only ones that will show up in the drop-down box will be the ones with the code installed, have a valid activation code, and you had selected to be a target system. Use the drop-down box to select the NAS appliance that will be used as the target system and click **Next**. as shown in Figure 2-28.

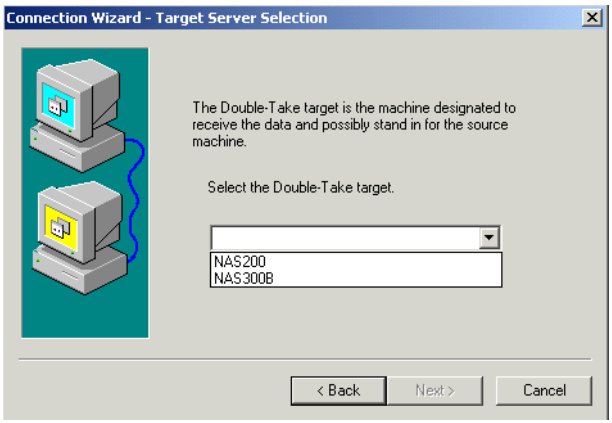

Connection Wizard - Target Server Selection
The Double-Take target is the machine designated to receive the data and possibly stand in for the source machine.
Select the Double-Take target.
NAS200
NAS300B
< Back
Next >
Cancel

*Figure 2-28 Double-Take — Choosing Target System*

The wizard will take you through creating a replication set. This is a list of all the files that need to be protected. You can either create a replication set or use an existing one. As you can see in Figure 2-29, we have decided to create a new replication set and call it “Test Mirror”. When you have finished, click **Next**.

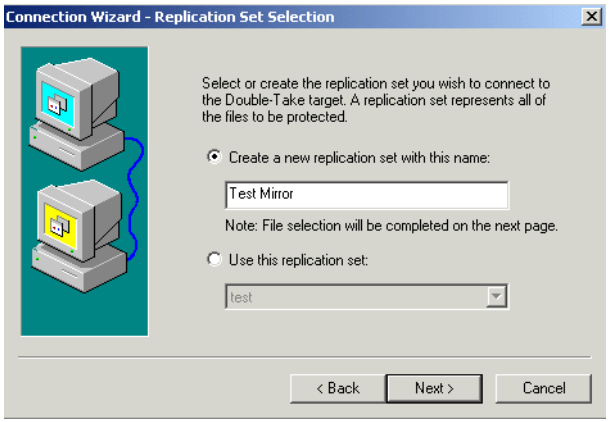

Connection Wizard - Replication Set Selection
Select or create the replication set you wish to connect to the Double-Take target. A replication set represents all of the files to be protected.
Create a new replication set with this name:
Test Mirror
Note: File selection will be completed on the next page.
Use this replication set:
test
< Back
Next >
Cancel

*Figure 2-29 Double-Take — Creating Replication Set*

The wizard will ask you to select the volumes and folders that you want to protect. You are beginning to define the replication set, that is, selecting the volume(s) and directories that will be included in the mirroring process. This is shown in Figure 2-30. When you are finished, click **Next**. to continue.

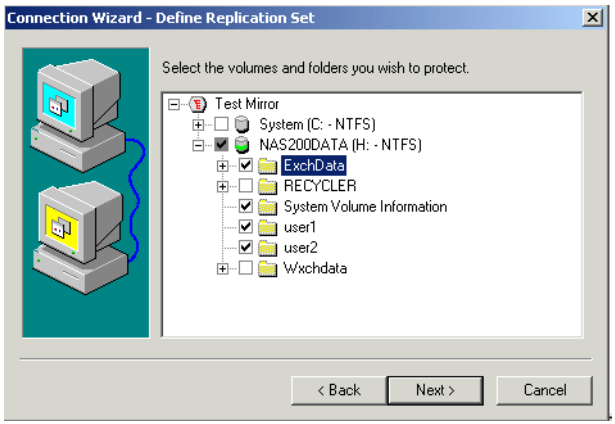



*Figure 2-30 Double-Take — Defining Replication Set*

You have defined the specific NAS appliance and data that will be the source, now you will supply the wizard with a location on the target machine. The target system had already been defined at the beginning of the wizard. You now need to select the appropriate path. You have the option of sending all the data to a single path or the same path. This is shown in Figure 2-31.

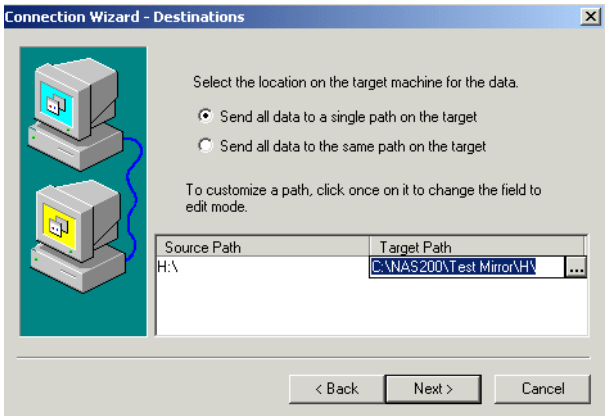

Connection Wizard - Destinations
Select the location on the target machine for the data.
Send all data to a single path on the target
Send all data to the same path on the target
To customize a path, click once on it to change the field to edit mode.
Source Path
Target Path
H:\
C:\NAS200\Test Mirror\H\
...
< Back
Next >
Cancel

*Figure 2-31 Double-Take — Destination of Data*

The Target Path allows you to browse to a location. By default, the pathing will be the name of the server, the name of the replication set, and the source drive. Double-click the **Target Path** and a browse window will appear to the right of the path as shown in Figure 2-32.

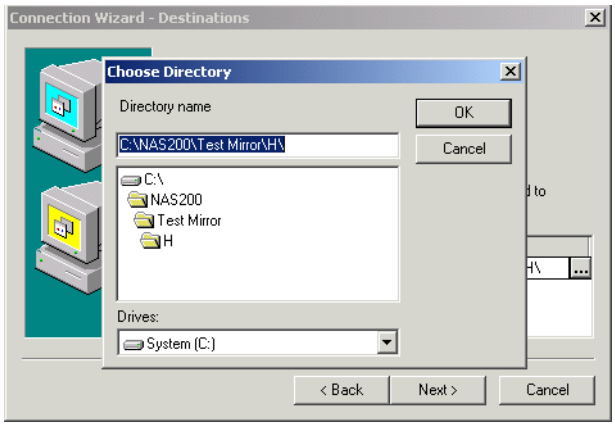



*Figure 2-32 Double-Take — Destination Browse Window*

You can browse to a different destination. Once you have selected the destination directory name, click **OK** and then click **Next**, as shown in Figure 2-33.

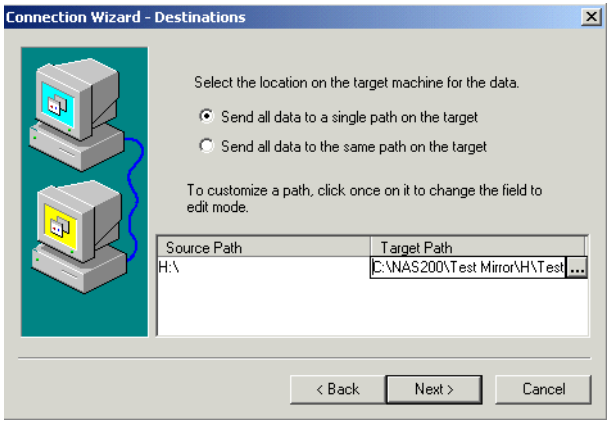

Connection Wizard - Destinations
Select the location on the target machine for the data.
Send all data to a single path on the target
Send all data to the same path on the target
To customize a path, click once on it to change the field to edit mode.
Source Path
Target Path
H:\
C:\NAS200\Test Mirror\H\Test
< Back
Next >
Cancel

*Figure 2-33 Double-Take — Destination Complete*

The wizard will bring up a final screen showing a summary of the connection information. You can continue if satisfied with the settings; otherwise click the **Back** buttons to change the appropriate setting. An **Advanced Options** button will allow you to adjust mirror, schedule, and failover options. Click **Finish** to complete the setup. See Figure 2-34.

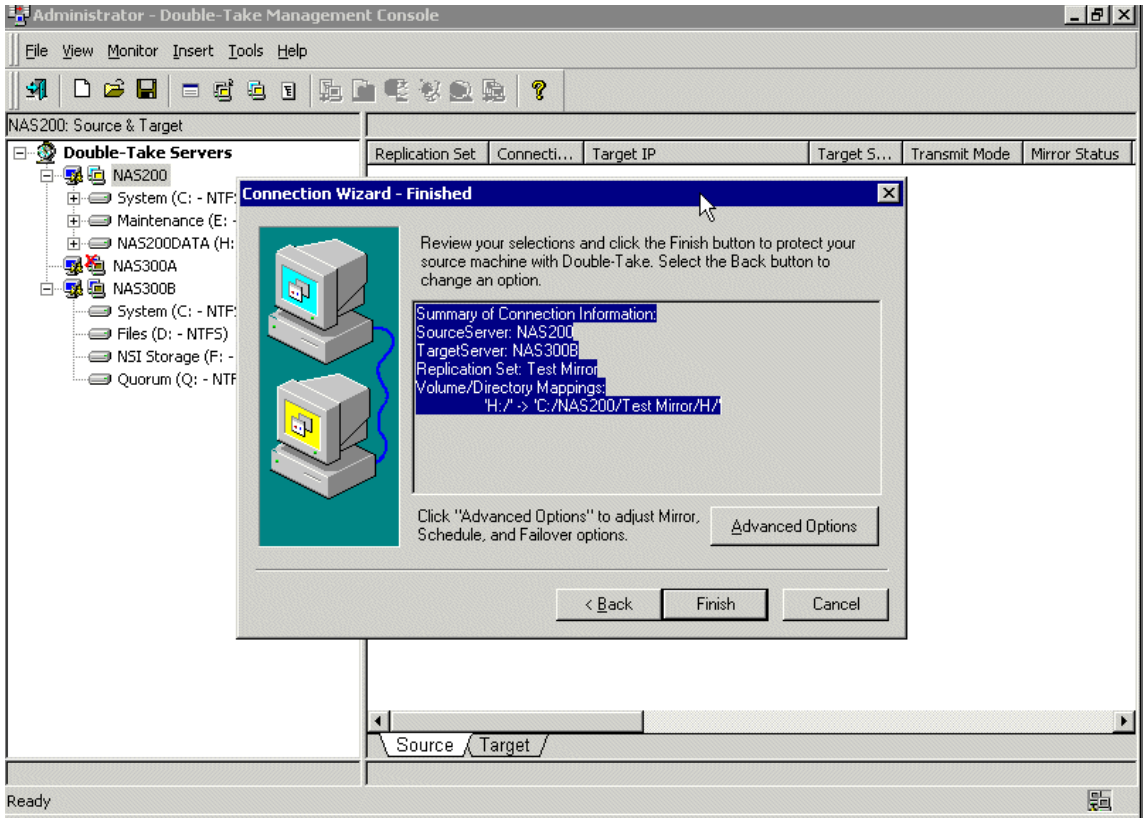



*Figure 2-34 Double-Take — Connection Wizard Finished*

You can now check to see if the mirror is operational. One way is to double-click the source server. There will be an icon and the name of your replication set. Open up the replication set and observe the settings. You can also verify by going back to the main window and clicking the source. It will show the replication sets and other pertinent information like IP address, target, mirror status, and so on. These checks are shown in Figure 2-35.

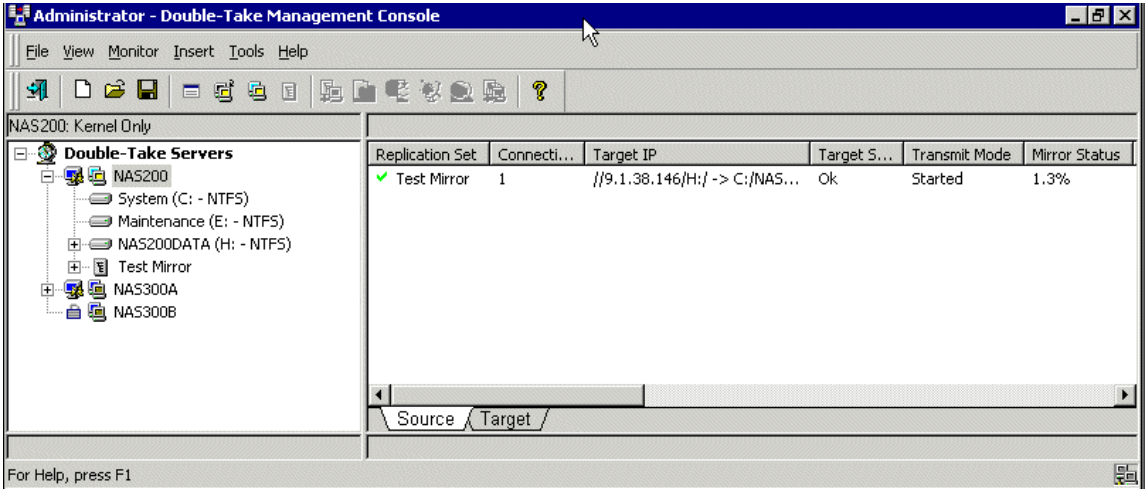



*Figure 2-35 Double-Take — Verifying Replication Set*

You have just completed a mirror that will take your source data and replicate it to the target system in real-time. IBM's NAS appliances and Double-Take together are just more ways that IBM ensures your company's data availability.

For more information on NSI Double-Take, please refer to:

http://www.nsisoftware.com/

3

# Microsoft Windows NT Backup

In this chapter we provide an overview of the native backup solution shipping with the IBM TotalStorage NAS systems, as well as a guide on how to configure and use the software that is provided. The IBM NAS Backup Assistant is also covered here.

© Copyright IBM Corp. 2002

## 3.1 NT Backup

The IBM TotalStorage NAS products are pre-loaded with Windows NT Backup and the NAS Backup Assistant. This approach can be used to back up operating system data or user data, either to disk or tape. The pre-loaded Persistent Storage Manager function is in this case the recommended method of resolving the “open file” issue.

There are two ways to back up the files in the NAS appliance when you use the NT backup method. You can either access it through the NAS administration console or the Windows Terminal Services. The NAS administration console is accessed via the **Maintenance** -> **System Backup and Restore** -> **Backup** option in the Web user interface. For this approach, you should first create a Persistent Image before the NT Backup is started. Use this method if you want to back up a selected folder from one of the persistent images, or the system partition.

The other method is to use the NAS Backup Assistant tool. The NAS Backup Assistant automatically creates a Persistent Image and starts the NT Backup program. Use this method to back up the data on a volume or file level basis. These are the steps to be executed to perform a Backup using the NAS Backup Assistant tool:

1. Use **Windows Terminal Services** from any NAS client to access the NAS appliance.
2. Select **Start** —> **IBM NAS Admin.msc** —> **Backup and Restore**.
3. This leads you to the IBM NAS Admin display.

4. Select **Backup and Restore** —> **IBM NAS Backup Assistant** from the left pane. This will present you with a screen similar to Figure 3-1.

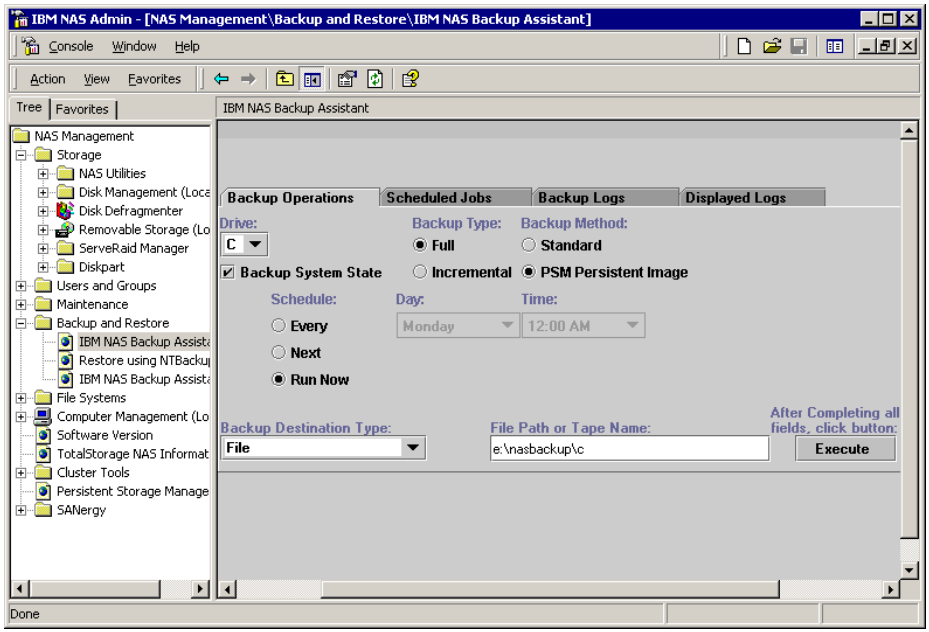



*Figure 3-1 NT Backup — NAS Backup Wizard*

5. In the right pane, the following options appear:
   - **Backup Operations:** Select drive, schedules, backup types, backup methods, destination type, file path or tape name.
   - **Schedule Jobs:** List jobs scheduled for backups. You can also delete jobs that have been scheduled but not yet executed.
   - **Backup Logs:** Shows logs of all backups. You can view or delete logs here.
   - **Display Logs:** Allows you to display the logs.
6. Now, in the Backup Operations screen, select the drive you want to back up (here: drive C:), the backup type (full or incremental), the backup method (standard or PSM Persistent Image), the scheduling (here: run now), the backup destination type and path (we chose to back up to a file on the local drive E:; typically the backup should be performed onto a tape device).
7. Now click **Execute**. The backup process will start by creating a True Image of the selected drive (if you selected PSM Persistent Image as the backup method) and then invokes the NT Backup program to perform a backup from the image to the backup target that you specified.

8. When the backup process is finished, click the **Backup Logs** tab. You will see a screen as shown Figure 3-2.

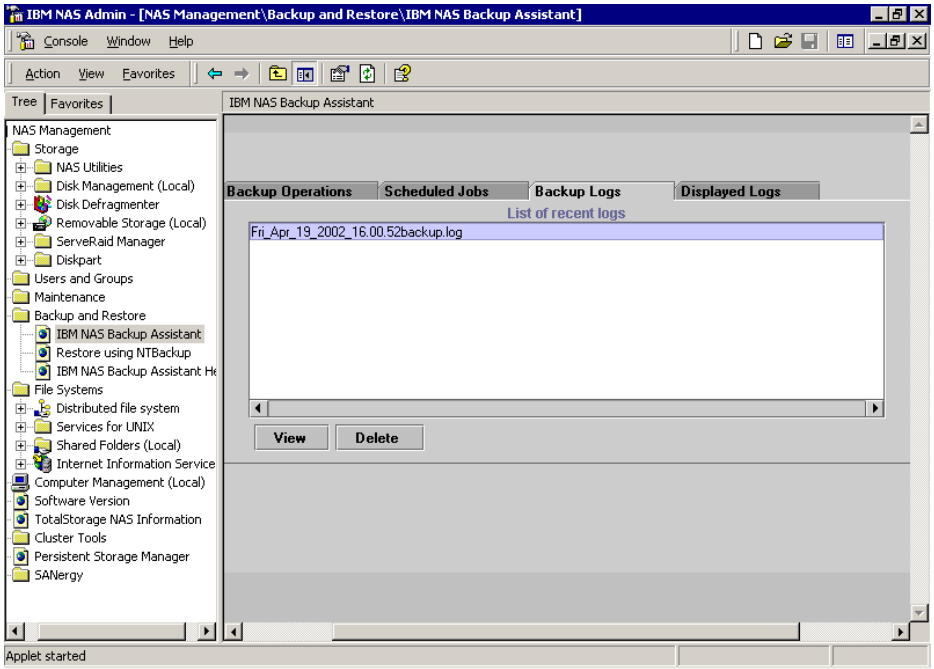



*Figure 3-2 NT Backup — Backup Logs screen*

9. Select the log you want to examine and click **View**. You will be presented with screens similar to those shown in Figure 3-3 and Figure 3-4.

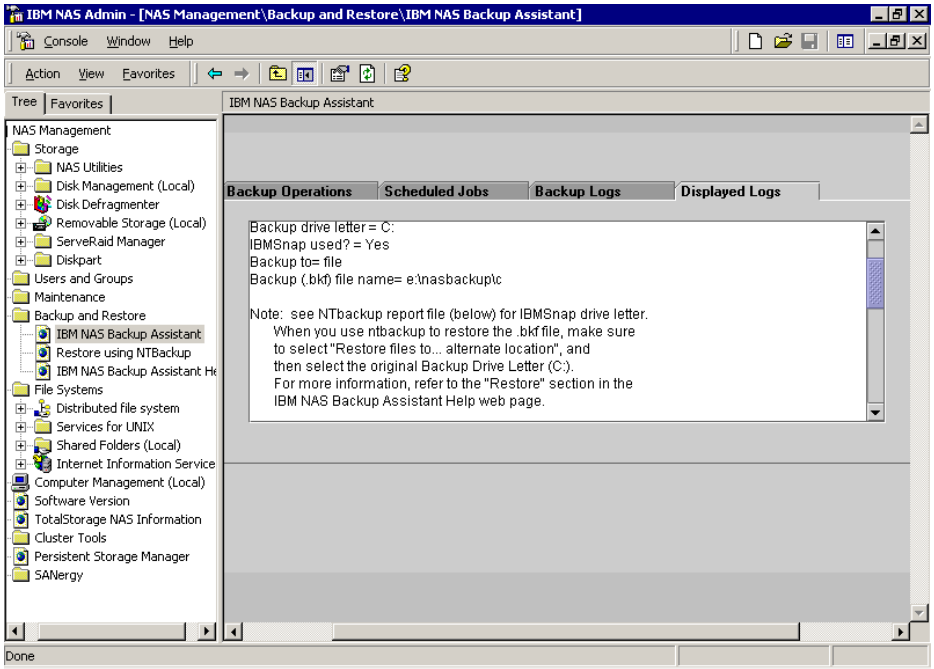



*Figure 3-3 NT Backup — NAS Backup log, page 1*

Figure 3-4 shows the second part of the NAS Backup log page.

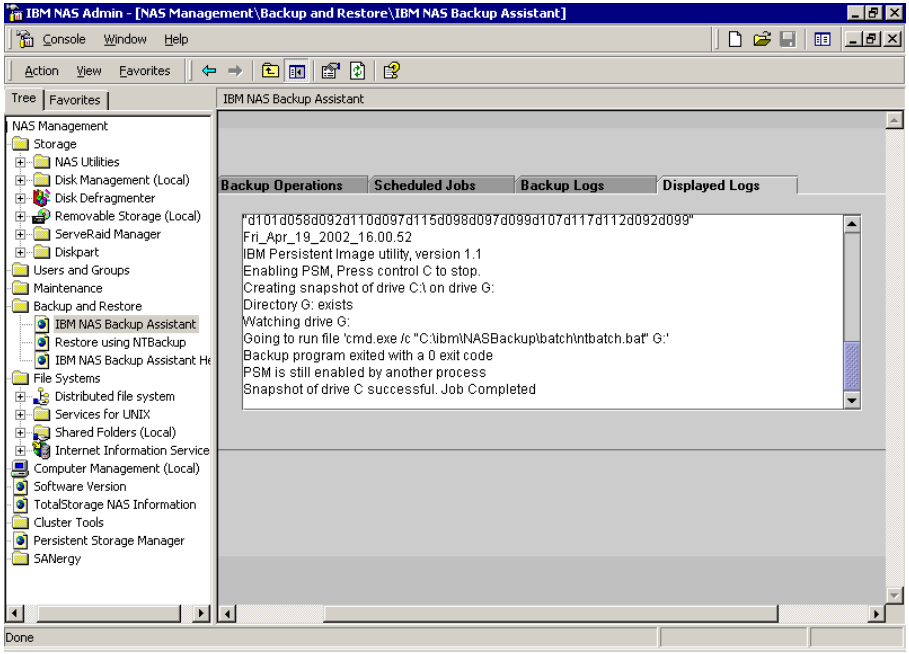



*Figure 3-4 NT Backup — NAS Backup log, page 2*

**Tip:** For help on the NAS Backup Assistant please go to **Start** -> **IBM NAS Admin.msc** -> **Backup and Restore** -> **IBM NAS Backup Assistant Help**

## Restore

To restore, go to **Start** —> **IBM NAS Admin.msc** —> **Backup and Restore** —> **Restore Using NT Backup**. This presents you with a screen as shown in Figure 3-5.

Backup - [Untitled]
Job Edit View Tools Help
Welcome Backup Restore Schedule Jobs
Welcome to the Windows 2000 Backup and Recovery Tools
Backup Wizard
The Backup wizard helps you create a backup of your programs and files so you can prevent data loss and damage caused by disk failures, power outages, virus infections, and other potentially damaging events.
Restore Wizard
The Restore wizard helps you restore your previously backed-up data in the event of a hardware failure, accidental erasure, or other data loss or damage.
Emergency Repair Disk
This option helps you create an Emergency Repair Disk that you can use to repair and restart Windows if it is damaged. This option does not back up your files or programs, and it is not a replacement for regularly backing up your system.

*Figure 3-5 NT Backup — Backup and Recovery Wizard default screen*

From here on, follow this procedure:

1. Select the **Restore** tab (this produces a screen similar to Figure 3-6).

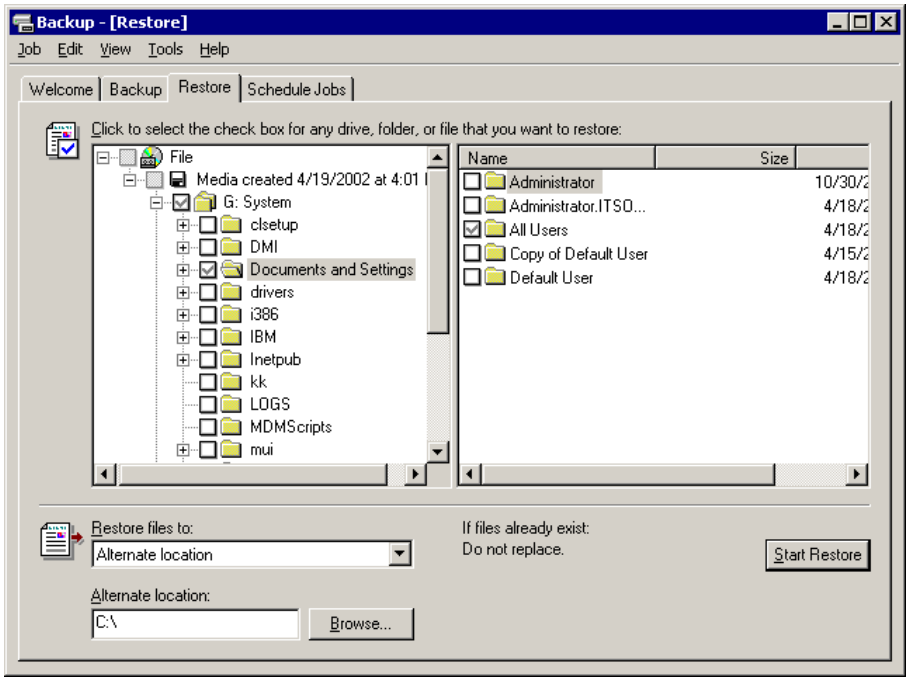



*Figure 3-6 NT Backup — Backup and Recovery Wizard restore screen*

Here, select the source from which to restore (in this example, the file we defined as the backup target earlier in the chapter) and the data in the source that you want to restore (files, directories, and the like). Also, you have to define the target location to which the files must be restored.

**Important:** As we used the PSM Persistent Image as the backup method (which means that a new drive letter — like G: — is created for the image and then the backup is started with this drive letter as a parameter to NT Backup) we now have to change the restore location to the target we want to restore to. Otherwise, NT Backup would try to restore the files to the image — which is not what we want.

2. Now select **Start Restore**.
3. You may select **Advanced Options**, then confirm the restore source.

4. The restore process will now start. When it is finished, you will be presented with a screen similar to Figure 3-7.

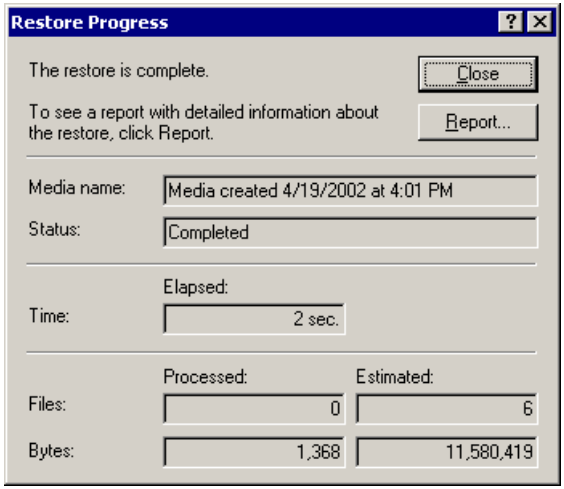



*Figure 3-7 NT Backup — Restore Progress screen*

5. Check the Restore Report for any errors during the restore, then select **Close** to finish the restore.

Congratulations! You have successfully backed up and restored data from the IBM TotalStorage NAS device using the built-in NT Backup software, plus tools provided by IBM to ease to backup and restore tasks.

## 3.1.1 IBMSNAP utility

To provide flexibility for your existing backup solution, persistent image functionality is implemented in such a way that any backup application that supports command line backups will be supported. This includes Tivoli Storage Manager (TSM), Veritas Backup Exec, and many others.

The IBM NAS systems come with a command line utility called *IBMSNAP.EXE* that allows you to use PSM technology with your existing backup software solution. Usage of this utility requires knowledge of Windows batch file processing plus the backup software command line utility. *IBMSNAP.EXE* is a command line utility that creates a PSM image, launches the backup batch file, and then sets the archive bits accordingly on the drive being backed up.

The *IBMSNAP.EXE* file is located in the *C:\ibm\NASBackup* directory.

Usage of *IBMSNAP.EXE*:

```
ibmsnap /l:{drive} /files:{backup_script_file} /exit
```

Where:

*{drive}* = volume you want to have a PSM image of

*{backup_script_file}* = script or batch file that PSM runs after creating image

/exit = exit and close PSM

## 3.1.2 Using IBMSNAP with NT Backup

To use IBMSNAP with NT Backup, you will need to create a batch file on the NAS box that calls NT Backup with the necessary parameters:

1. Get connected to your NAS system.
2. From a command prompt, type **notepad *yourbatchfile*** (for example, ntback-h.bat). See Figure 3-8.

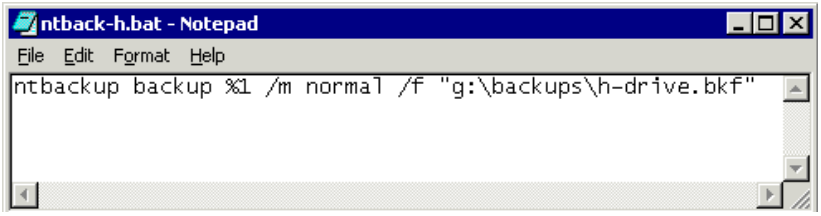



*Figure 3-8 Sample batch file calling NT Backup*

Where:

%1 = persistent image virtual drive letter to be supplied by PSM automatically; the drive letter that will be used by PSM is the next available drive on your system

/m = mode (in the example, we selected normal)

/f = the backup file (and its location)

3. Run IBMSNAP (from C:\ibm\NASBackup directory) with the necessary parameters. For example:

```
ibmsnap /l:h /files:c:\winnt\system32\ntback-h.bat /exit
```

Where:

h = drive to be backed up

ntback-h.bat = batch file to execute NT Backup

4. You should see a screen (on the NAS Terminal Services Client session) similar to the one shown in Figure 3-9.

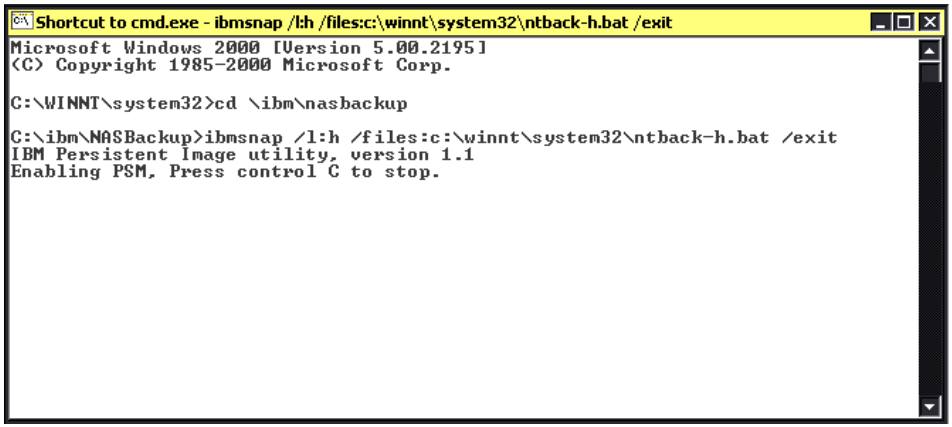

Shortcut to cmd.exe - ibmsnap /l:h /files:c:\winnt\system32\ntback-h.bat /exit
Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-2000 Microsoft Corp.
C:\WINNT\system32>cd \ibm\nasbackup
C:\ibm\NASBackup>ibmsnap /l:h /files:c:\winnt\system32\ntback-h.bat /exit
IBM Persistent Image utility, version 1.1
Enabling PSM, Press control C to stop.

*Figure 3-9 Screen showing IBMSNAP running and PSM creating an image*

After that, NT Backup should start (Figure 3-10).

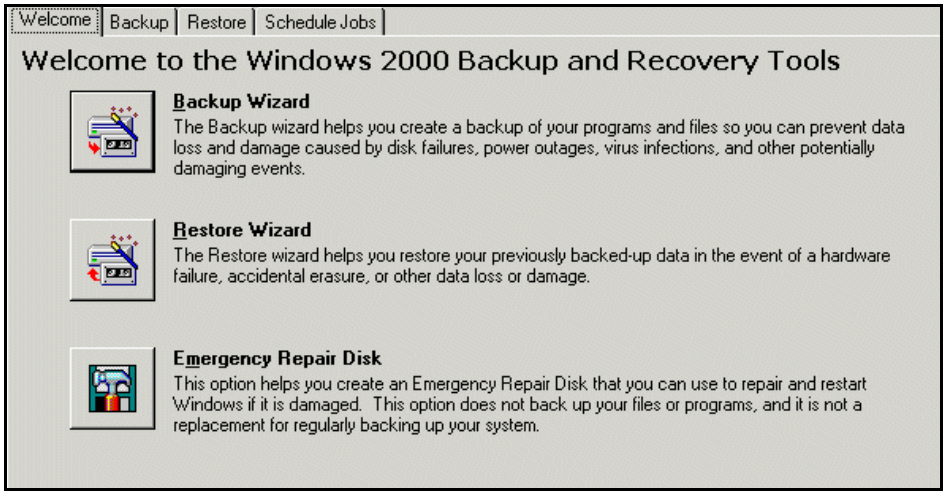

Welcome
Backup
Restore
Schedule Jobs
Welcome to the Windows 2000 Backup and Recovery Tools
Backup Wizard
The Backup wizard helps you create a backup of your programs and files so you can prevent data loss and damage caused by disk failures, power outages, virus infections, and other potentially damaging events.
Restore Wizard
The Restore wizard helps you restore your previously backed-up data in the event of a hardware failure, accidental erasure, or other data loss or damage.
Emergency Repair Disk
This option helps you create an Emergency Repair Disk that you can use to repair and restart Windows if it is damaged. This option does not back up your files or programs, and it is not a replacement for regularly backing up your system.

*Figure 3-10 NT Backup started automatically by IBMSNAP*

5. You should next see that the backup is being done, as in Figure 3-11. This screen shows an on-going backup of removable disk F, which contains a PSM image of drive H.

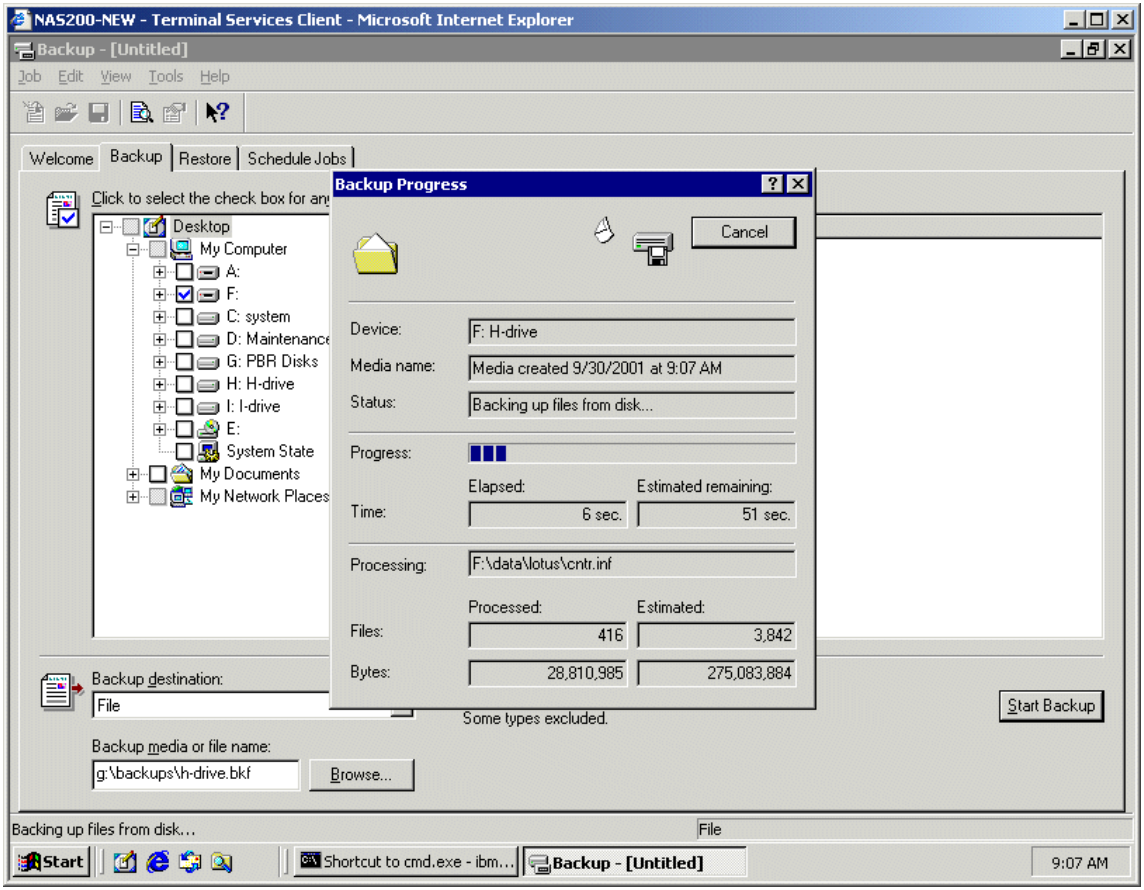



*Figure 3-11 On-going backup of removable disk F with PSM image of drive H*

6. Once the backup is completed, you will be returned to the command prompt. It should display a screen similar to the one in Figure 3-12, showing that IBMSNAP and NT Backup have completed successfully.

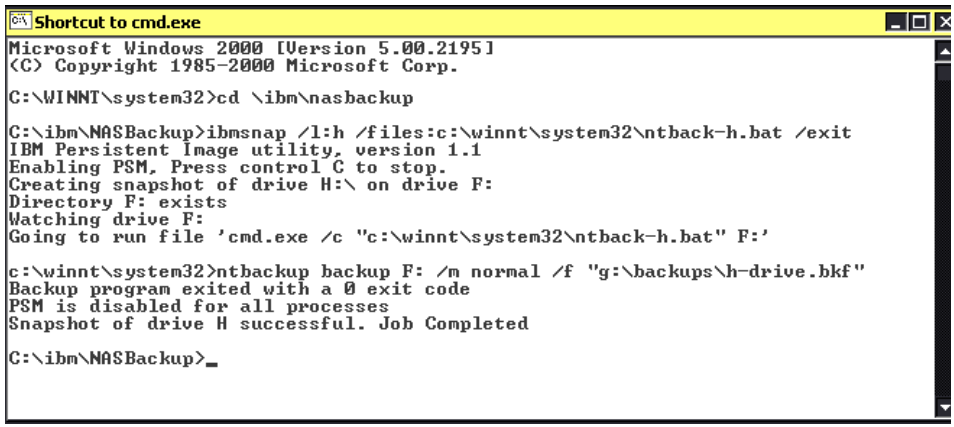

Shortcut to cmd.exe
Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-2000 Microsoft Corp.
C:\WINNT\system32>cd \ibm\nasbackup
C:\ibm\NASBackup>ibmsnap /l:h /files:c:\winnt\system32\ntback-h.bat /exit
IBM Persistent Image utility, version 1.1
Enabling PSM, Press control C to stop.
Creating snapshot of drive H:\ on drive F:
Directory F: exists
Watching drive F:
Going to run file 'cmd.exe /c "c:\winnt\system32\ntback-h.bat" F:'
c:\winnt\system32>ntbackup backup F: /m normal /f "g:\backups\h-drive.bkf"
Backup program exited with a 0 exit code
PSM is disabled for all processes
Snapshot of drive H successful. Job Completed
C:\ibm\NASBackup>_

*Figure 3-12 Successful completion of IBMSNAP and NT Backup*

7. You can check if the backup file has been created (Figure 3-13).

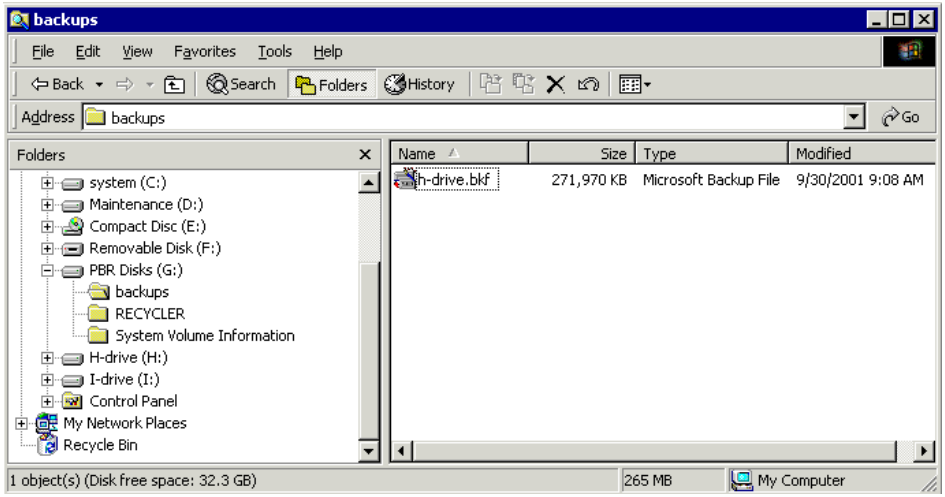



*Figure 3-13 Screen showing the backup file created*

8. Notice also that there is the “Removable Disk (F:)” on the NAS as shown in Figure 3-13. This is the temporary location to which the persistent image was stored by PSM for the NT Backup purpose. Drive F: was used because it is the next available drive.

   While the backup takes place, you should be able to access the removable disk. But once it has completed and IBMSNAP has finished, this removable disk is no longer accessible. To release the removable disk, you should logoff and logon to your system.

### 3.1.3 Creating a scheduled NT Backup with IBMSNAP

If you want to schedule the creation of a persistent image and then back it up, you need to create two batch files, one that calls IBMSNAP at the scheduled time, and another one that calls NT Backup. Then you need to use the Windows **at** command to create an entry on the Task Scheduler to call the IBMSNAP batch file at your specified time.

Here is an example:

1. Create a batch file that calls IBMSNAP (Figure 3-14).

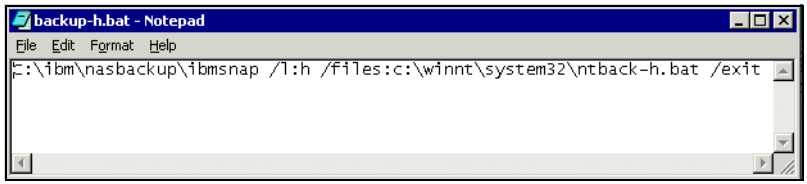



*Figure 3-14 Sample batch file that calls IBMSNAP*

2. Create the batch file called by IBMSNAP, which in turn calls NT Backup (Figure 3-15).

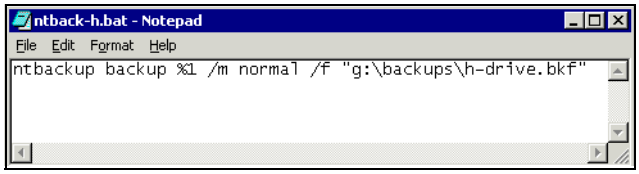



*Figure 3-15 Sample batch file that calls NT Backup*

3. On the NAS command prompt, type “at *time* “ibmsnap_batch_file”, for example:

```
at 11:00pm "c:\winnt\system32\backup-h.bat"
```

4. You should see that the job is added to Task Scheduler with a specific job ID. To confirm, at the command prompt, type **at** (Figure 3-16).

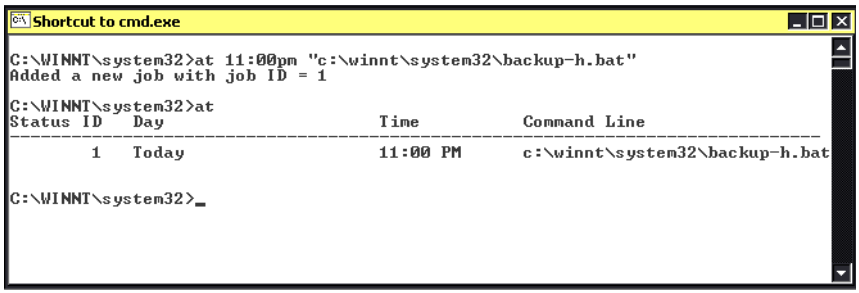

Shortcut to cmd.exe
C:\WINNT\system32>at 11:00pm "c:\winnt\system32\backup-h.bat"
Added a new job with job ID = 1
C:\WINNT\system32>at
Status ID Day Time Command Line
1 Today 11:00 PM c:\winnt\system32\backup-h.bat
C:\WINNT\system32>

*Figure 3-16 Screen showing the scheduled job for IBMSNAP*

For more information on NT Backup, refer to the original Microsoft documentation.

**Important:** Please be aware that if you back up files directly from a PSM persistent image, the entire path name of each backed up file is preserved. As a result, when you restore such a file, it will attempt to restore to the persistent image and not to the original volume.

"Restore Using NT Backup" should only be used in situations where standard backup (that is, not open file) is deemed sufficient, and you only want to back up a few selected files (as opposed to an entire volume). For all other backups, using NT Backup, the NAS Backup Assistant should be used.

# 4

# Tivoli Storage Manager (TSM)

In this chapter we introduce the Tivoli Storage Manager Agent 4.2. The agent is pre-installed on the IBM TotalStorage NAS devices and provides an easy way to include the NAS devices into your existing Tivoli Storage Manager backup and recovery environment.

Discussion of the features of Tivoli Storage Manager and additional software such as Tivoli Data Protection Modules is not in the scope of this paper. Please see the available Redbooks on:

http://www.redbooks.ibm.com

© Copyright IBM Corp. 2002

# 4.1 Introduction to Tivoli Storage Manager

IBM Tivoli Storage Manager ensures availability of business applications while driving improved return on storage management investment, by providing superior data protection and resource utilization that scales with business needs. Tivoli Storage Manager is an enterprise-class recovery solution, protecting your business critical data from the laptop to the IBM zSeries regardless of where it resides.

Tivoli Storage Manager supports business continuance by helping to automate disaster recovery planning and recovery execution based on business priorities. Tivoli Storage Manager integrates the power of applications-aware technology in the recovery of leading database, content management, and workflow applications to ensure your entire business-process is protected.

Tivoli Storage Manager ensures your data integrity by copying active on-line data to off-line and off-site storage, even from 24x365 applications. If your data growth exceeds your storage capacity, Tivoli Storage Manager can effectively extend your capacity.

Tivoli Storage Manager moves inactive data from on-line storage to less expensive off-line or near line storage. Tivoli Storage Manager ensures the data integrity on any number of computers running any of more than a dozen different operating systems, from laptops to mainframes.

### Backup/restore

Complete data protection starts with data backups. Backups are a copy of your active on-line data stored on off-line storage. If an on-line storage device fails, a data error occurs, or someone accidentally deletes a file, the off-line copy of that data can be copied back to on-line storage restored. Tivoli Storage Manager is famous for its extremely efficient backup methods. Tivoli Storage Manager uses multiple techniques to reduce data transfer sizes to the minimum possible. These techniques reduce the total time required for both data backups and more importantly, data restores.

### Disaster preparation and recovery

Complete data protection also involves disaster preparation and recovery. Local copies of data will protect against discrete failures or errors in equipment, storage or people. But disasters tend to happen to entire facilities, not just a portion of the equipment inside those facilities.

Tivoli Storage Manager will prepare an additional copy of your active data for safekeeping at an off-site location to provide that extra insurance against disasters. Should a disaster strike and destroy your on-line storage and computers, the off-site copy of your active data can be restored to new computers to get your business up and running quickly.

## Archive/retrieve

Tivoli Storage Manager goes beyond just data backups to include data archiving. Until on-line storage is as inexpensive as off-line storage, archiving inactive data is an effective way to reduce your on-line storage costs. The cost of storing a gigabyte of data using on-line storage is typically thirty times more expensive than the same gigabyte using off-line storage. Some percentage of your data is inactive if it hasn't been accessed in weeks if not months. Does that inactive data need to remain in on-line storage? Tivoli Storage Manager will move that inactive data to off-line storage, thus freeing up on-line disk space for more important active data. Should you find that the inactive data you archived must be used again, Tivoli Storage Manager will retrieve that data for you.

## Hierarchical Storage Management

Tivoli Storage Manager also includes a more automated version of archive called Hierarchical Storage Management or HSM. Like archiving, HSM removes data from on-line storage and puts it on less expensive off-line storage. But unlike archive, HSM leaves a data-stub in on-line storage that shows the name of the removed file. With this stub, you can easily access the off-line data albeit much more slowly than if it were on-line. Tivoli Storage Manager's HSM capabilities are automated and will watch on-line data-files to see how often they are used. If not opened for an administrator specified length of time, they will be removed to off-line storage leaving only the data-stub behind. For many businesses with huge amounts of data, but not all of it needed on-line all the time, HSM is the best way to save on storage costs.

## 24 x 365 application protection

Some of todays most business-critical application programs must remain on and active 24 hours a day for 365 days a year. Fortunately, the manufacturers of some of these important programs understand the need for data protection. Some applications have a built-in capability to control external data protection applications. By directly controlling the time and method by which a data transfer to off-line storage occurs, the application can continue operating with no interruption.

## Enterprise management

Tivoli Storage Manager is a client-server application. One Tivoli Storage Manager server handles hundreds of Tivoli Storage Manager clients. Tivoli Storage Manager's administration control is extremely flexible via a hierarchy of administrators each designated with different management authority levels and specific domains defining user groups or applications.

Multiple administrators can manage Tivoli Storage Manager simultaneously with full data integrity. Multiple Tivoli Storage Manager servers can be controlled from any Tivoli Storage Manager server or via a Web interface from any computer. Data restore requests can be initiated and controlled from the Tivoli Storage Manager client, greatly reducing workload for the administrator.

The heart of the Tivoli Storage Manager server is an integrated relational database. This database catalogs each data transfer backup, archive, HSM, etc, and the complete set of data for every Tivoli Storage Manager client.

If you tell Tivoli Storage Manager to do data backups every day, the database allows the restore of data from every day in the past for as far back as you specify. Tivoli Storage Manager lets you go back in time to previous versions of your data files. You specify the frequency of backups, where the copied data is held (magnetic disk storage pool, optical disk, data tape, etc.), how long it is held there until migrating the next storage type, and how long each version is kept before it is erased and the space it used is made available for new data copies. You also specify how often data tapes should be tested for data integrity what percent of empty should a tape be before its data is consolidated to another tape (freeing complete tapes for reuse), and how quickly should data from single users be migrated from multiple tapes to a single tape to speed data restores.

## Management automation

All the management capabilities of Tivoli Storage Manager can be automated. Automation control is via an extremely granular policy engine. This engine can be configured down to the individual file level to cover the who, what, where, when, and how of data transfers. Who has access to this file? What data should be transferred? Where should it be transferred to? When should Tivoli Storage Manager check to see if the file has changed and must be transferred again? How should the transfer occur? With Tivoli Storage Manager's policy-based automation engine configured and enabled, Tivoli Storage Manager really is a set-it and forget-it application. Tivoli Storage Manager reports what it has done and alerts you to anything out of the ordinary.

## Hardware support

The best automation and management features for data protection mean little if they won't work with the computers you have. Tivoli Storage Manager's client software supports seventeen different operating systems. Tivoli Storage Manager's server software runs on eight operating systems. Platforms vary from laptop computers all the way up to mainframe computers.

Any server can work with any client all cross platform Solaris with Windows, AIX with Solaris, O/S390 with HP-UX any combination. Tivoli Storage Manager supports more than 400 off-line storage devices including optical disk and tape.

To make sure your backups and restores can happen as efficiently as possible, Tivoli Storage Manager also supports multiple network types — dial-up, the internet, WAN, LAN and SAN are each maximized for the data bandwidth they are capable of. Tivoli Storage Manager is also an open product. Its Application Programming Interface (API) is available to anyone through the Tivoli Ready program.

## Data transfer

Even with the largest data pipes connecting servers and clients, Tivoli Storage Manager minimizes the amount of data going over those pipes. Because of Tivoli Storage Manager's integrated relational database, Tivoli Storage Manager is smart:

- Smart enough to know that if a file hasn't changed, it doesn't need to be backed up again — ever.
- Smart enough to know that if only a few bytes of a file have changed, only those bytes must be backed up again.

For those data transfers that include many bytes, Tivoli Storage Manager is optimized for disk-to-disk transfers. Instead of transferring data from the disk of a client computer, over the network, directly to a tape, Tivoli Storage Manager will instead make the first transfer to a disk storage pool. After an administrator-specified length of time (hours, days or weeks) the data on that storage pool is migrated to other less-expensive off-line storage devices. This technique allows more data to be moved faster, reducing the total time of all data transfers both from and to clients. Disk-to-disk provides a data transfer technique better matched to the higher bandwidths of SANs and other Gigabit networks.

At the other of the bandwidth spectrum, if a dial-up or internet connection is dropped, Tivoli Storage Manager is smart enough to pick up where it left off. Instead of starting a transfer all over again when the connection is restored, Tivoli Storage Manager continues from where it previously ended.

### Unique differentiators

Tivoli Storage Manager has two unique features — its incremental backups that only back up the files that have changed since the last backup, and its ability to effectively utilize the disk and tapes in its storage hierarchy. The combination of these two mean less data being sent over your network, less tape drives needed to write the data and fewer tapes needed to store that data.

Tivoli Storage Manager does more than just backup your clients data — it has numerous products that integrate directly with the centralized server. These products allow you to back up your application databases, help you generate a plan for recovering from a disaster, move seldom used files off of clients local disk to near line storage, and generate in-depth reports to help you analyze and forecast your backup procedures.

Tivoli Storage Manager is great for the administrators, because there is so much flexibility in how you set up your backup policies, storage hierarchies, schedules and off-site disaster protection. In addition there is great flexibility in where you administer the product from as Tivoli Storage Manager can be administered over the Web from where ever you are.

## 4.2 Agent installation and configuration

As the TSM Agent is already pre-installed in the IBM TotalStorage NAS appliances, we only describe the agent configuration here.

The IBM Network Attached Storage products have been pre-installed with the Tivoli Storage Manager (TSM) Agent. This enables you to back up the data in the NAS appliance. Since this is only a TSM client code, you will require a TSM server (which is another server in the network) to perform the actual backup. Based on the TSM server's configuration, the final destination of the NAS appliance's backup may either be located in the TSM server's disk storage or an attached tape subsystem. The latter is the preferred target location.

As in the NT Backup method, you will have to ensure that the persistent images are created before activating this backup function. Automated scheduling to back up these PSM images can then be configured in the TSM server.

The TSM client uses an option file to store its configuration. Once the setup is completed, it creates an option file on the IBM NAS appliance in the following directory and file name:  C:\Program Files\Tivoli\TSM\baclient\dsm.opt

Here are the steps needed to configure the TSM client:

1. Access the NAS appliance locally or use Terminal Services to connect.
2. Select **Start** —> **Programs** —> **Tivoli Storage Manager** —> **Backup Archive GUI**
3. This produces the TSM Client Configuration Wizard (as shown in Figure 4-1).

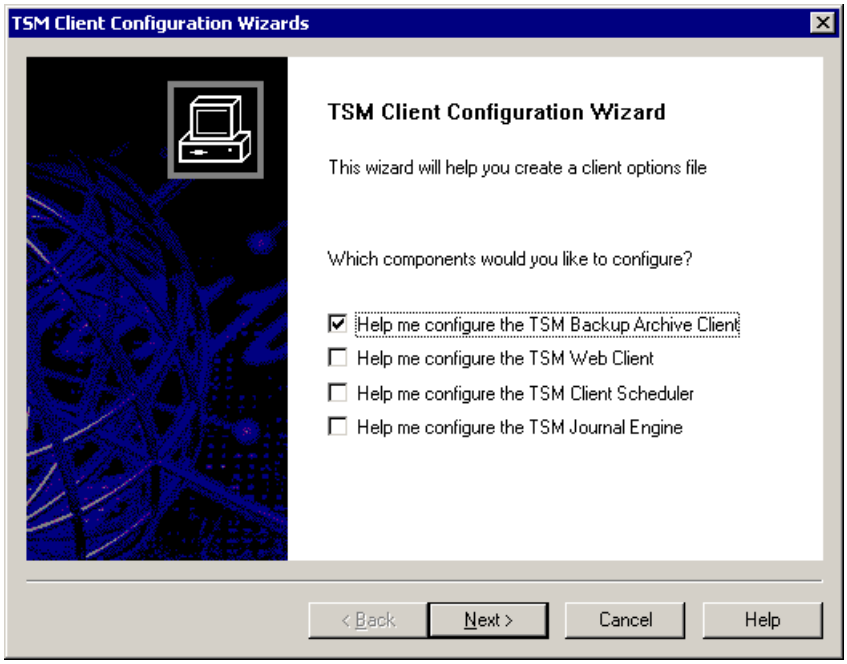

TSM Client Configuration Wizards
TSM Client Configuration Wizard
This wizard will help you create a client options file
Which components would you like to configure?
Help me configure the TSM Backup Archive Client
Help me configure the TSM Web Client
Help me configure the TSM Client Scheduler
Help me configure the TSM Journal Engine
< Back
Next >
Cancel
Help

*Figure 4-1 TSM Client Configuration Wizard — default screen*

4. Select the following:
   - **Help me configure the TSM Backup Archive Client**

5. Click **Next**, you will see a screen similar to Figure 4-2.

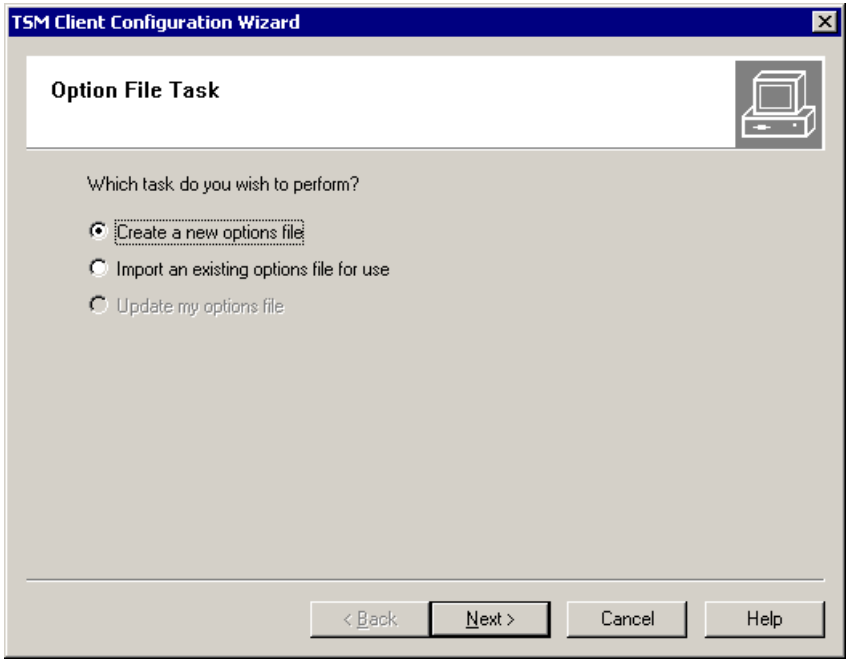

TSM Client Configuration Wizard
Option File Task
Which task do you wish to perform?
Create a new options file
Import an existing options file for use
Update my options file
< Back
Next >
Cancel
Help

*Figure 4-2 TSM Client Configuration Wizard — Option File Task*

6. Then check the following:
   - **Create a new option file.**
     Select this option for a new setup. Select this option if you are setting up the first time.
   - **Import an existing option file for use.**
     Select this option only if the dsm.opt file was previously created by the system administrator on some other machine.
   - **Update my options file.**
     Select this option if you want to update a previously configured dsm.opt on the same machine.
7. Click **Next**, and you are asked to enter the TSM Node Name to use. This should be the name of the TSM Client; that is, the NAS appliance. An example to enter is *IBM_NAS_TSM_CLIENT*.
8. Click **Next**, and the TSM Client/Server Communications screen is displayed. Select **TCP/IP**.

9. Click **Next**, and you will be asked for the TCP/IP Parameters (see Figure 4-3).

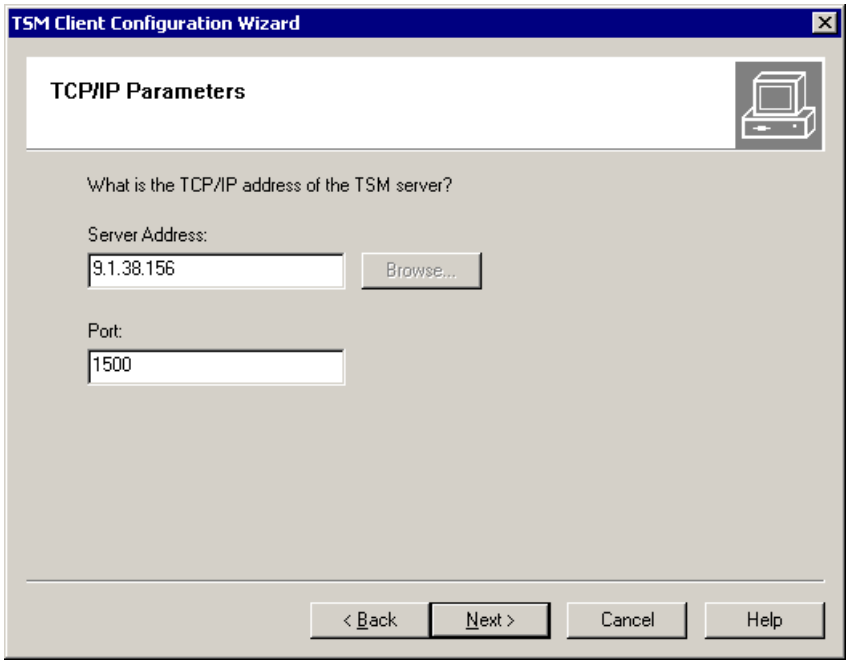



*Figure 4-3 TSM Client Configuration Wizard — TCP/IP Parameters*

10. Enter the **Server Address**. This is the TSM Server's IP address, for example, 192.1.1.5.
11. Enter the **Port Address** as: **1500**. This is the default value.
12. Select **Next**, and make sure that the following are configured according to your needs:
    - Domain List
    - Include-Exclude Options

Refer to Figure 4-4 and Figure 4-5.

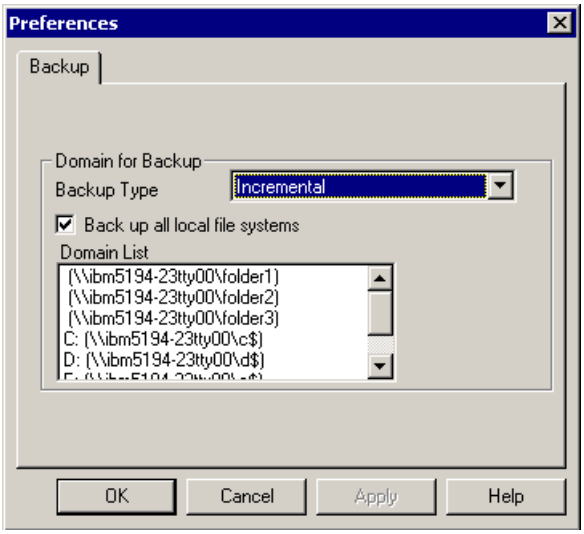



*Figure 4-4 TSM Client Configuration Wizard — Domain List*

**Domain List:**
Click the **Edit** button to select the directory to be backed up.

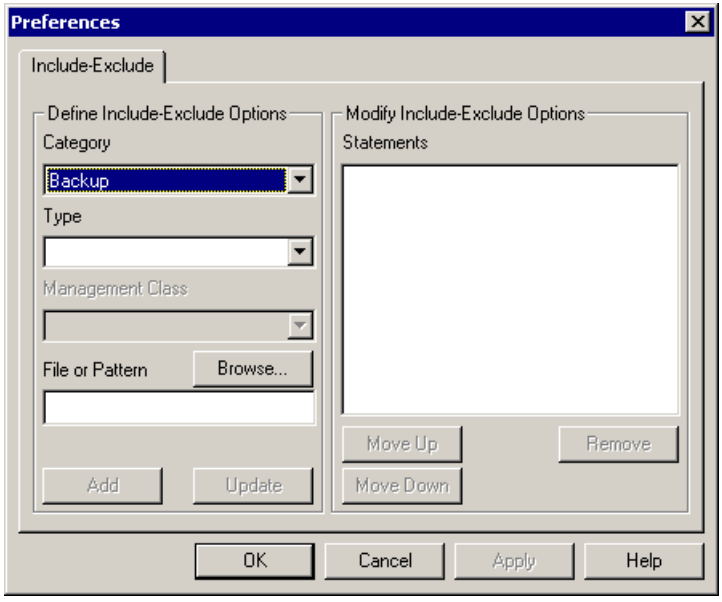



*Figure 4-5 TSM Client Configuration Wizard — Include-Exclude Options*

**Include-Exclude options:**
Click the **Edit** button to either include or exclude some files from the list.

13. Select **Next**, and **Finish** to complete the TSM client configuration.

**Note:** To finish the client installation, it is necessary that the client is registered within the TSM server. Please refer to 4.3, “Server configuration” on page 79 for more details.

Example 4-1 is a sample of the DSM.OPT file in the NAS appliance:

*Example 4-1 TSM client — sample dsm.opt file in the NAS appliance*

```
NODENAME          IBM_NAS_TSM_CLIENT
PASSWORDACCESS    GENERATE
DOMAIN            “(\\ibm-23ttn07\share_e)"
DOMAIN            "(\\ibm-23ttn07\share_g)"
DOMAIN            ALL-LOCAL
TCPSERVERADDRESS  192.1.1.5
```

After successful installation of the TSM Agent, you are prompted to login to the TSM Server with a screen similar to Figure 4-6.

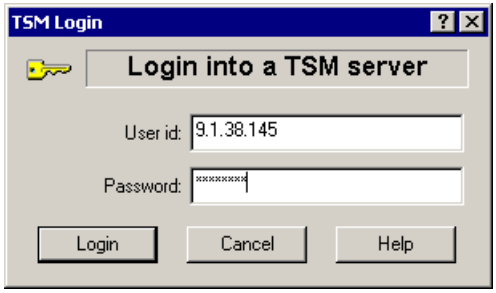



*Figure 4-6 TSM Client Configuration Wizard — Login to a TSM server*

Next you will be presented with the TSM Client default screen, as shown in Figure 4-7.

*Figure 4-7 TSM Client — default screen after installation*

Congratulations! You have successfully set up the TSM client on your IBM TotalStorage NAS device.

## 4.3 Server configuration

We assume that you already have knowledge regarding the configuration of a TSM server. Here we give you a quick example of how to integrate an IBM TotalStorage NAS device into the TSM server configuration.

1. On your TSM server, start the **Client Node Configuration Wizard** (this depends on your server version and administrative configuration), then click **Next** (see Figure 4-8).

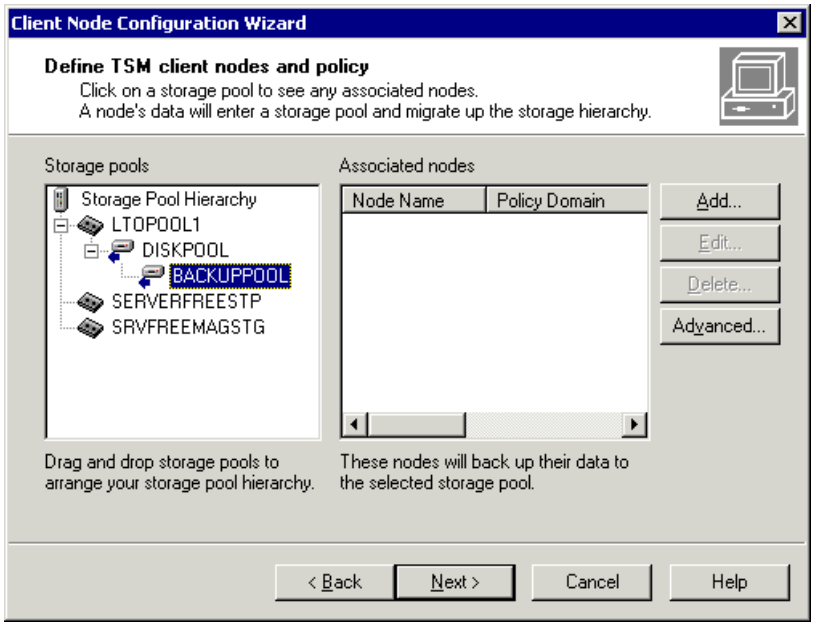



*Figure 4-8 TSM Client Node Configuration Wizard — Define TSM client nodes*

2. Click **Add** to add a node. You will be prompted to enter the node properties, as shown in Figure 4-9. Enter the node name (as configured on the client) and the password for that node, then define which policy the node should be linked to. When you are done entering the information, click **OK**.

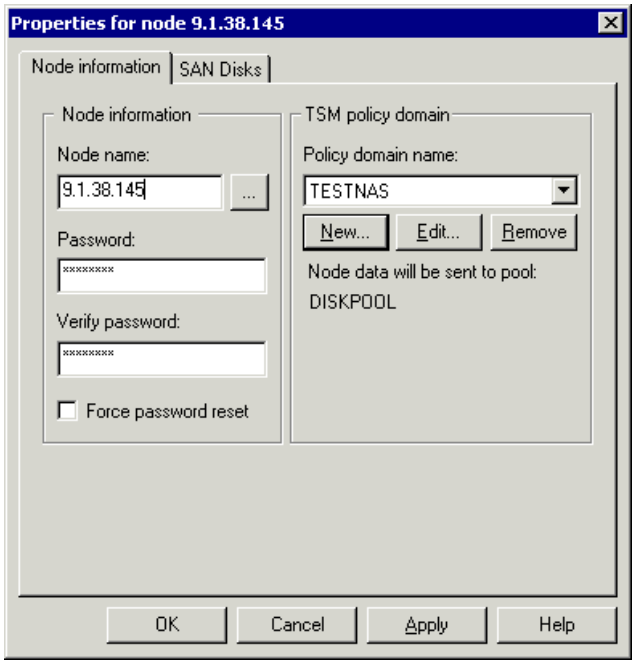



*Figure 4-9 TSM Client Node Configuration Wizard — Node properties*

3. You will see a screen similar to Figure 4-10.

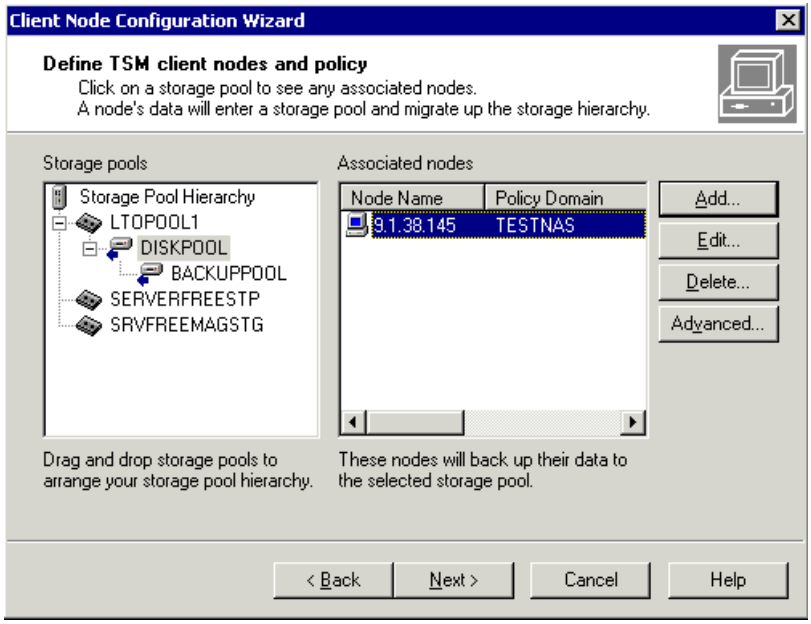



*Figure 4-10 TSM Client Node Configuration Wizard — TSM client nodes*

4. Click **Next** and **Finish** to proceed.

Congratulations! You should now see the client node in your client node list. For example, in the Web management interface on a TSM 5.1 server, this should look similar to Figure 4-11.

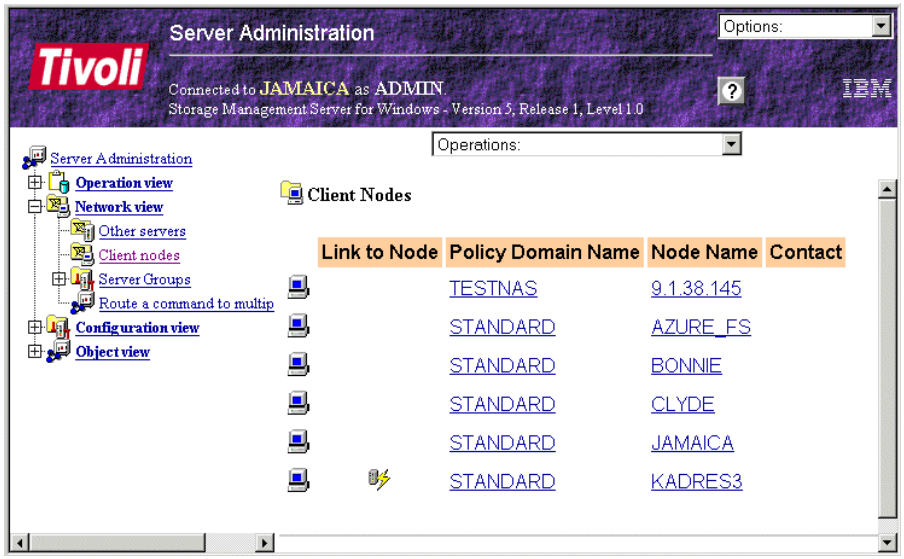



*Figure 4-11 TSM Server — Web Administration Interface node list*

## 4.4 Starting a Backup

To initiate a backup from the NAS device, connect using Terminal Services.

1. Select **Start** —> **Programs** —> **Tivoli Storage Manager** —> **Backup Archive GUI**.
2. This leads you to the Tivoli Storage Manager GUI.
3. Select **Backup**.
4. Select the data to be backed up (as shown in Figure 4-12).
5. Select **Backup**.

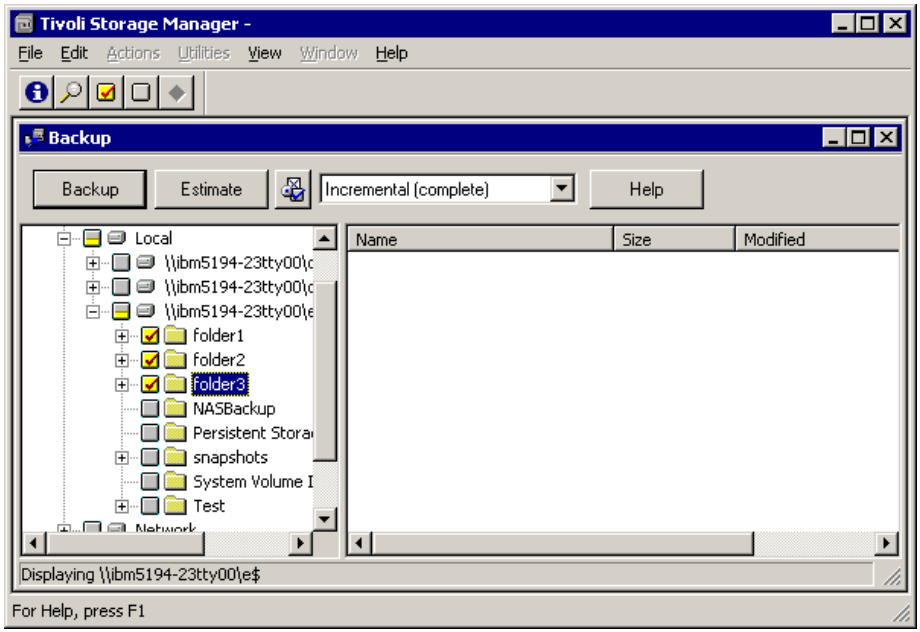



*Figure 4-12 TSM Client — Backup selection*

When the backup is done, you will be presented with the backup report, as shown in Figure 4-13.

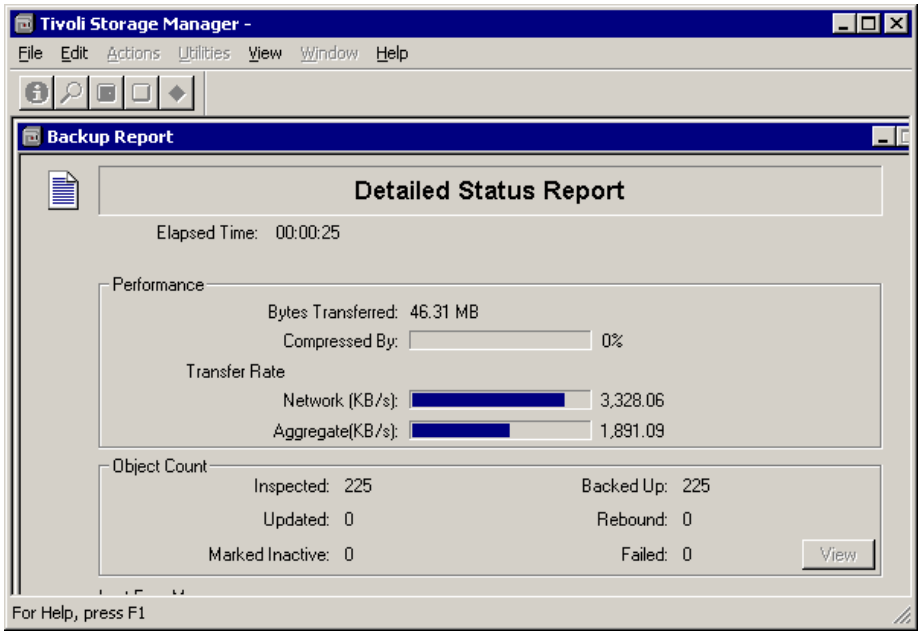



*Figure 4-13 TSM Client — Backup report*

Congratulations! You have already made the first backup of your IBM TotalStorage NAS device using Tivoli Storage Manager.

To restore the files from the TSM Client, follow these steps:

1. Use **Windows Terminal Services** from any NAS client to access the NAS appliance.
2. Select **Start** —> **Programs** —> **Tivoli Storage Manager** —> **Backup Archive GUI**.
3. This leads you to the Tivoli Storage Manager GUI.
4. Select **Restore**.
5. Select the Backup Set to be used as the source and the data to be restored.
6. Select **Restore**.

It is not possible to cover all possible configuration settings in a TSM server environment in this paper. For more information, as well as the TSM User's Guide, please see:

`http://www.redbooks.ibm.com`

## 4.4.1 Using IBMSNAP with TSM

In this section we discuss the use of IBMSNAP with TSM.

### *Creating the batch file that calls IBMSNAP*

The procedure for running the IBMSNAP is independent of the backup solution (whether NTBackup, TSM, or any other that supports the command line utility). However, for simplification of scheduling the TSM backup of the PSM image, we will create a batch file that executes the IBMSNAP command.

Here is the procedure:

1. On a command prompt, type Notepad *batch_file*". For example:

   ```
   notepad tsmbackup-i.bat
   ```

2. Enter the **IBMSNAP** command with appropriate parameters. Refer to 2.2.1, "IBMSNAP Utility" on page 38 for the available parameters and their usage. Save and close Notepad (Figure 4-14).

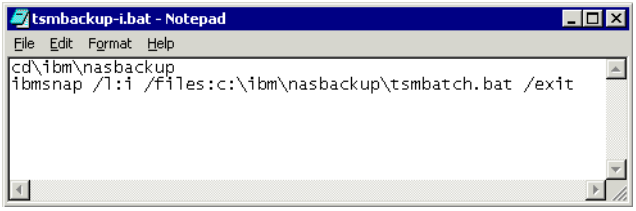



*Figure 4-14 Sample IBMSNAP batch file*

### *Creating a batch file that calls TSM*

TSM has the "dsmc.exe" utility that enables the command line backup execution. However, to run properly, it has to be executed within the *\baclient* subdirectory. Therefore, the change directory entry has to be added on the batch file.

Unlike NTBackup, TSM uses volume labels to keep track of the drives on the machine. It is therefore important to have unique volume labels on the NAS. This reveals a problem, since IBMSNAP uses the volume label of the source drive for the volume label of the temporary Removable Disk that it creates. For example, suppose your NAS drives are the following:

*Table 4-1 Sample NAS disk configuration*

| Drive Letter | Volume Label | Drive Letter | Volume Label |
|---|---|---|---|
| C: | SYSTEM | G: | TEST |
| D: | DATA | H | USERS |
| E: | CD-ROM | I: | SQLDATA |

While using IBMSNAP, you create a persistent image of D: whose volume label is *DATA*. IBMSNAP will create a temporary Removable Disk whose drive letter will be F: (since it is the first available letter), and which will be assigned the volume label *DATA*.

So, as far as TSM is concerned, you have two volumes (drives D: and F:) with the same label. If you back up F: (which the batch files do), the process will fail. It is very important, therefore, that you rename the temporary Removable Disk before the TSM backup runs. This can be done by adding a **`label`** command on your batch file.

**Important:** While using TSM and PSM together, you need to rename the Removable Disk generated by PSM before starting the TSM backup.

Here is the procedure for creating a TSM batch file:

1. On your command prompt, type “notepad *batch-file*”. For example:

```
notepad tsmbatch.bat
```

2. Add the necessary entries for the batch file. Take note that in Figure 4-15, the “label” command is on the first line, to work around the problem of having duplicate volume labels.

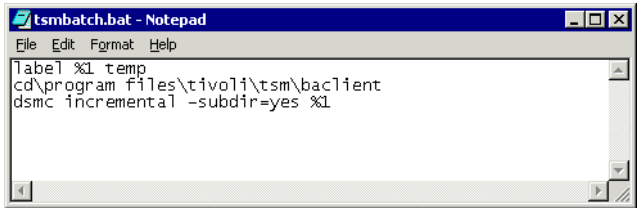



*Figure 4-15 Sample batch file calling TSM*

3. Remember also that for the %1 variable: IBMSNAP will supply the correct drive letter. Also, you may want to set the “PASSWORDACCESS” parameter on the *dsm.opt* file to “GENERATE”, so that you will not be required to specify the password on the **`dsmc`** command for security reasons.
4. For more details on the available parameters for “dsmc.exe” and their meaning, please refer to the on-line information on your TSM Client Program.
5. Finish by clicking **Save** and **Exit**.

### *Executing automated TSM backup of persistent image*

Now that everything is prepared, we can run the automated TSM backup of persistent images. Here are the steps:

1. On a command prompt, execute the batch file that calls IBMSNAP (Figure 4-16). For example:

   ```
   tsmbackup-i.bat
   ```

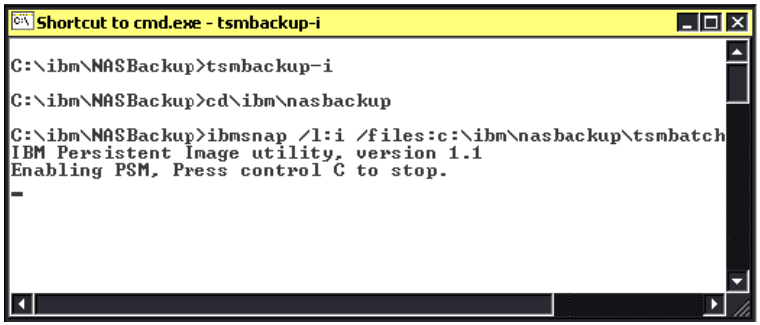



*Figure 4-16 Screen right after running IBMSNAP batch file*

2. PSM will then run and create a snapshot of the specified volume on the batch file. Also, the screen should show that the Removable Disk volume label has been changed to avoid duplication with the source volume (Figure 4-17).

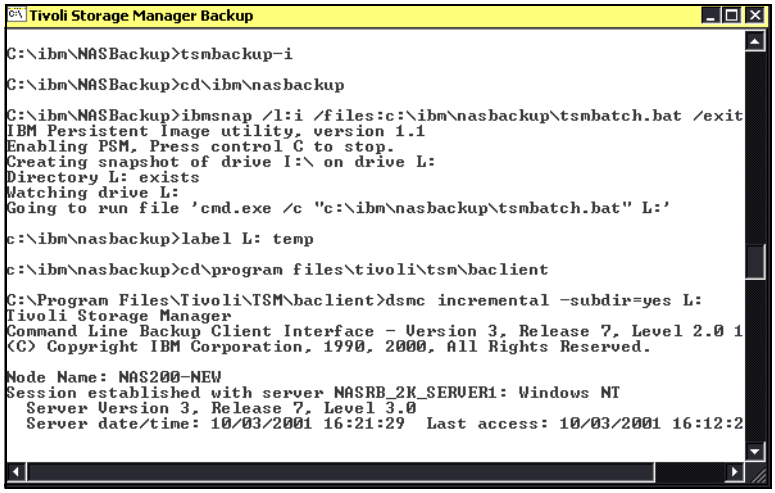

Tivoli Storage Manager Backup
C:\ibm\NASBackup>tsmbackup-i
C:\ibm\NASBackup>cd\ibm\nasbackup
C:\ibm\NASBackup>ibmsnap /l:i /files:c:\ibm\nasbackup\tsmbatch.bat /exit
IBM Persistent Image utility, version 1.1
Enabling PSM, Press control C to stop.
Creating snapshot of drive I:\ on drive L:
Directory L: exists
Watching drive L:
Going to run file 'cmd.exe /c "c:\ibm\nasbackup\tsmbatch.bat" L:'
c:\ibm\nasbackup>label L: temp
c:\ibm\nasbackup>cd\program files\tivoli\tsm\baclient
C:\Program Files\Tivoli\TSM\baclient>dsmc incremental -subdir=yes L:
Tivoli Storage Manager
Command Line Backup Client Interface - Version 3, Release 7, Level 2.0 1
(C) Copyright IBM Corporation, 1990, 2000, All Rights Reserved.
Node Name: NAS200-NEW
Session established with server NASRB_2K_SERVER1: Windows NT
Server Version 3, Release 7, Level 3.0
Server date/time: 10/03/2001 16:21:29 Last access: 10/03/2001 16:12:2

*Figure 4-17 Commands of the batch file being executed*

3. TSM backup will then proceed (Figure 4-18).

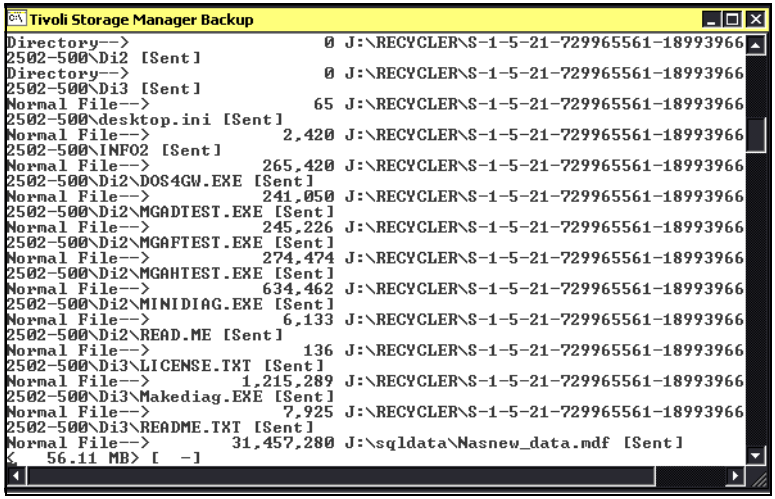



*Figure 4-18 Files being backed up by TSM*

4. Once the backup is done, the screen should look similar to the one shown in Figure 4-19.

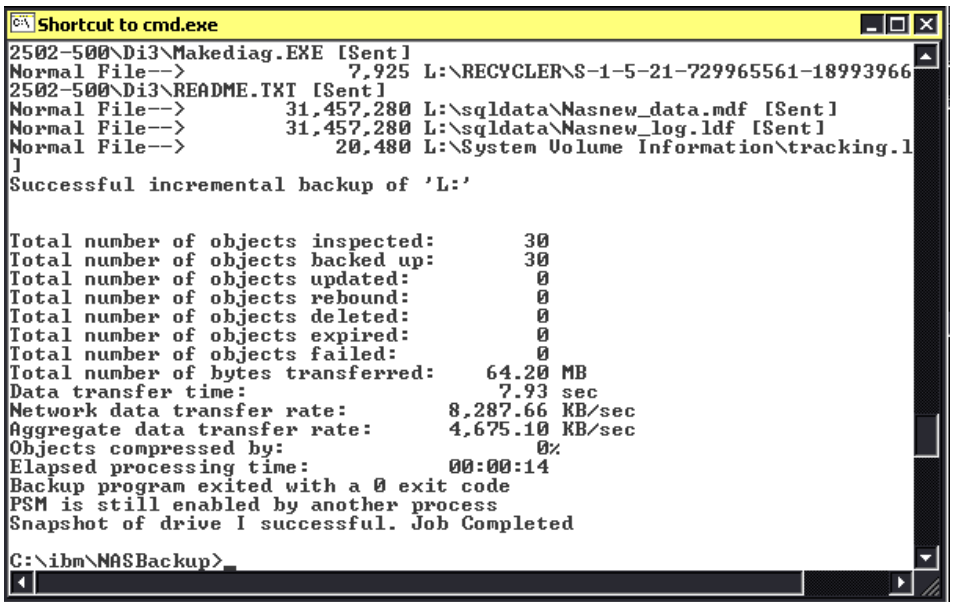

Shortcut to cmd.exe
2502-500\Di3\Makediag.EXE [Sent]
Normal File--> 7,925 L:\RECYCLER\S-1-5-21-729965561-18993966
2502-500\Di3\README.TXT [Sent]
Normal File--> 31,457,280 L:\sqldata\Nasnew_data.mdf [Sent]
Normal File--> 31,457,280 L:\sqldata\Nasnew_log.ldf [Sent]
Normal File--> 20,480 L:\System Volume Information\tracking.l
]
Successful incremental backup of 'L:'
Total number of objects inspected: 30
Total number of objects backed up: 30
Total number of objects updated: 0
Total number of objects rebound: 0
Total number of objects deleted: 0
Total number of objects expired: 0
Total number of objects failed: 0
Total number of bytes transferred: 64.20 MB
Data transfer time: 7.93 sec
Network data transfer rate: 8,287.66 KB/sec
Aggregate data transfer rate: 4,675.10 KB/sec
Objects compressed by: 0%
Elapsed processing time: 00:00:14
Backup program exited with a 0 exit code
PSM is still enabled by another process
Snapshot of drive I successful. Job Completed
C:\ibm\NASBackup>

*Figure 4-19 Screen showing PSM and TSM processes completing successfully*

To verify that the backup has been created on the TSM server, perform the following steps:

1. Open the TSM Server Web Admin window.
2. Click **Object view**, select **Clients**, then select **File Spaces**.
3. Our sample is shown in Figure 4-20.

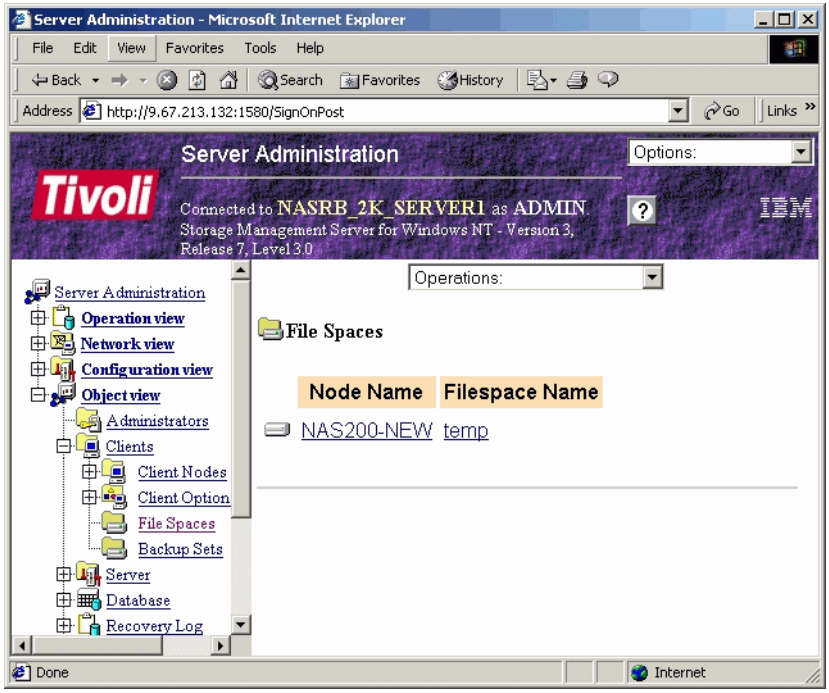



*Figure 4-20 TSM Web Admin screen showing the backups available*

4. Click the backup you just created to display the details, as shown in Figure 4-21.

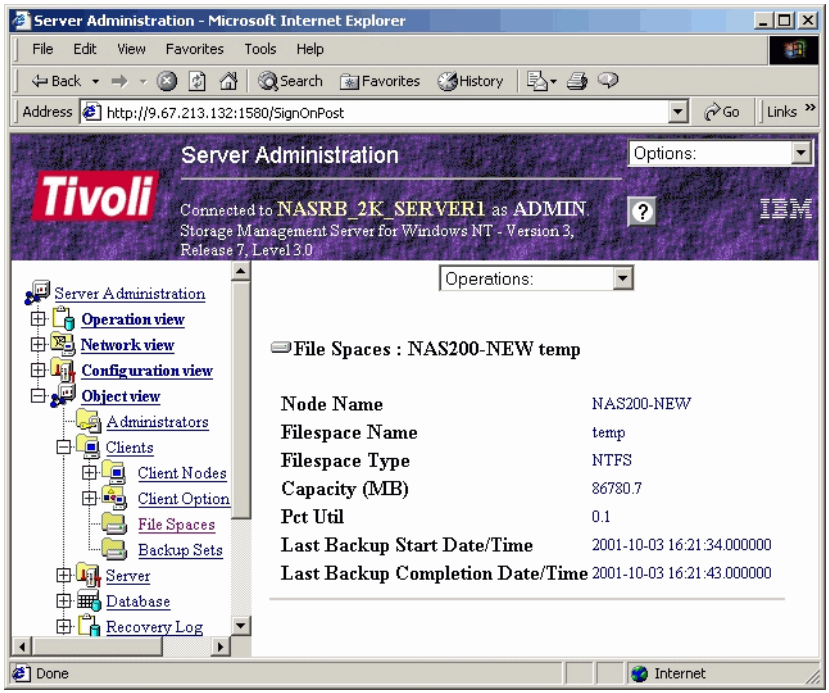



*Figure 4-21 Screen showing the backup details*

You now have the confirmation that the TSM backup from the NAS client was successful.

## 4.4.2 Creating a scheduled TSM backup using IBMSNAP

Just as when working with NTBackup, you need to use the **`at`** command utility of Windows 2000 to schedule the start of PSM and TSM. For example, you want to schedule a backup of I: drive's persistent image at 5 p.m., you need to execute on a command prompt the following command:

```
at 5pm "c:\ibm\nasbackup\tsmbackup-i.bat"
```

Where:

`tsmbackup-i.bat` = batch file that calls IBMSNAP

5

# BakBone NetVault

In this chapter we provide an overview of BakBone Software's NetVault. Then we explain how to install and configure the backup client on IBM TotalStorage NAS devices.

© Copyright IBM Corp. 2002

## 5.1 Introduction to BakBone NetVault

BakBone Software's NetVault product provides a backup solution for open systems customers. Support for all major operating systems (UNIX, Linux, NT/2000), network storage topologies and protocols (NAS, SAN, IP Storage, NDMP, SoIP, etc.), and all major enterprise applications (Oracle, SAP, DB2, Lotus, SQL, etc.) is provided.

For our testing we used NetVault 6.5.0. We will cover the basic steps to configure NetVault in an IBM TotalStorage NAS environment and provide some specific information where needed. We will not cover all features of NetVault and we will not explain all the available plug-in modules.

For more details on BakBone Software and their products, see their Web site at:

http://www.bakbone.com

**Note:** For updates on third party product certification, see the NAS Interoperability List on:

http://www.storage.ibm.com/snetwork/nas/nas_interoperability.html

## 5.2 Agent installation and configuration

After inserting the NetVault CD, the NetVault autorun screen is displayed, as shown in Figure 5-1. Select **Windows 2000** —> **Disk1** —> **SETUP.EXE**. This will start the setup program.

If you are using the IBM TotalStorage NAS device in a headless operation mode, you should connect to the system using the Terminal Services client and open an Explorer window. Run **x:\W2K\DISK1\SETUP.EXE**, where x: is your CD ROM drive letter.

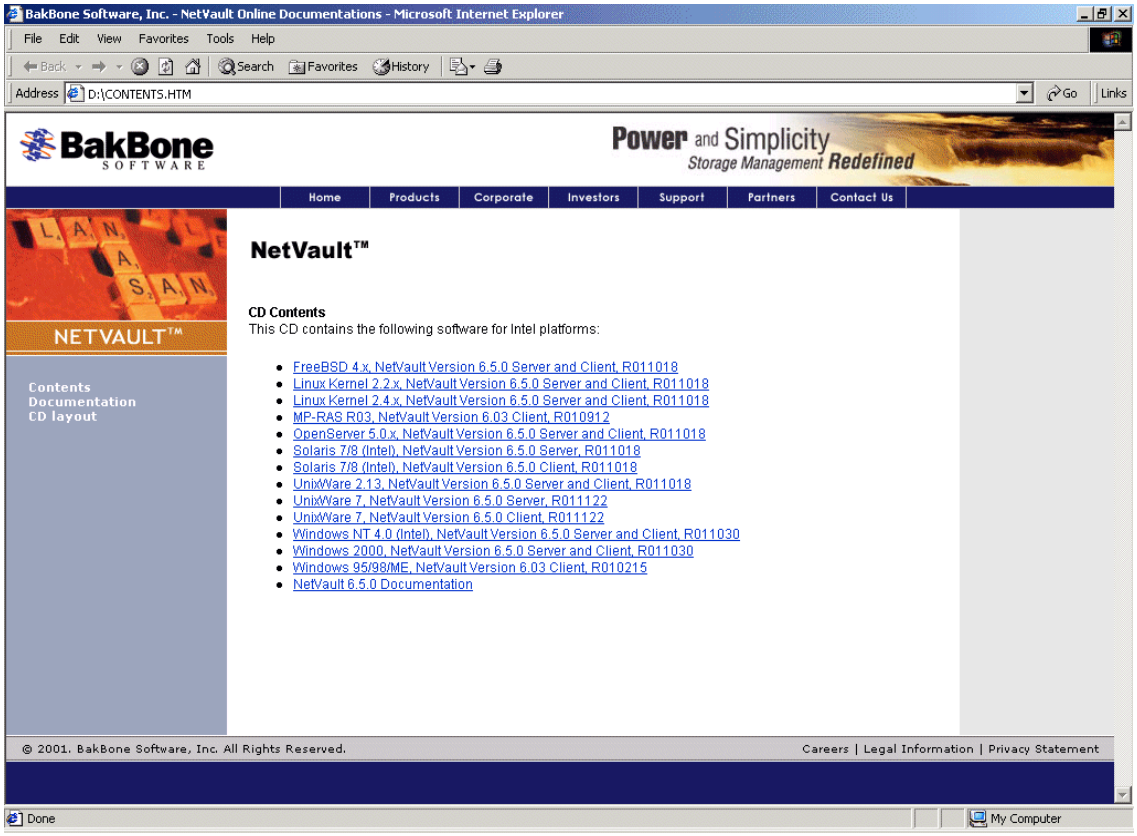

BakBone Software, Inc. - NetVault Online Documentations - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address D:\CONTENTS.HTM
Go Links
BakBone SOFTWARE
Power and Simplicity
Storage Management Redefined
Home Products Corporate Investors Support Partners Contact Us
NETVAULT™
Contents
Documentation
CD layout
NetVault™
CD Contents
This CD contains the following software for Intel platforms:
FreeBSD 4.x, NetVault Version 6.5.0 Server and Client, R011018
Linux Kernel 2.2.x, NetVault Version 6.5.0 Server and Client, R011018
Linux Kernel 2.4.x, NetVault Version 6.5.0 Server and Client, R011018
MP-RAS R03, NetVault Version 6.03 Client, R010912
OpenServer 5.0.x, NetVault Version 6.5.0 Server and Client, R011018
Solaris 7/8 (Intel), NetVault Version 6.5.0 Server, R011018
Solaris 7/8 (Intel), NetVault Version 6.5.0 Client, R011018
UnixWare 2.13, NetVault Version 6.5.0 Server and Client, R011018
UnixWare 7, NetVault Version 6.5.0 Server, R011122
UnixWare 7, NetVault Version 6.5.0 Client, R011122
Windows NT 4.0 (Intel), NetVault Version 6.5.0 Server and Client, R011030
Windows 2000, NetVault Version 6.5.0 Server and Client, R011030
Windows 95/98/ME, NetVault Version 6.03 Client, R010215
NetVault 6.5.0 Documentation
© 2001. BakBone Software, Inc. All Rights Reserved.
Careers | Legal Information | Privacy Statement
Done
My Computer

*Figure 5-1 NetVault Autorun screen*

The NetVault set up program welcomes you with the screen shown in Figure 5-2.

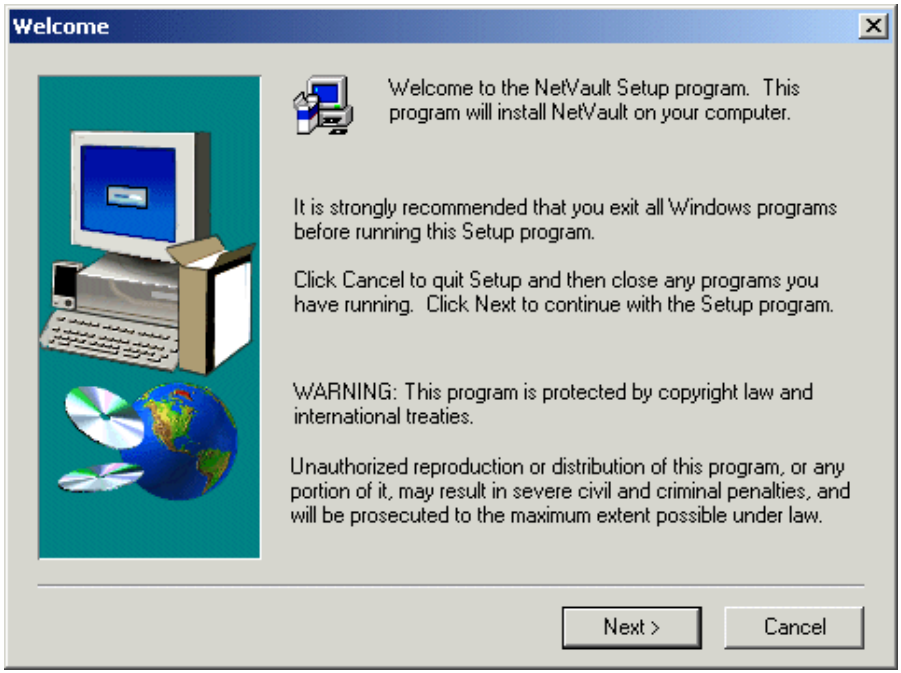

Welcome
Welcome to the NetVault Setup program. This program will install NetVault on your computer.
It is strongly recommended that you exit all Windows programs before running this Setup program.
Click Cancel to quit Setup and then close any programs you have running. Click Next to continue with the Setup program.
WARNING: This program is protected by copyright law and international treaties.
Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.
Next >
Cancel

*Figure 5-2 NetVault Welcome screen*

After accepting the Software License Agreement, you will be asked for the user information, as depicted in Figure 5-3.

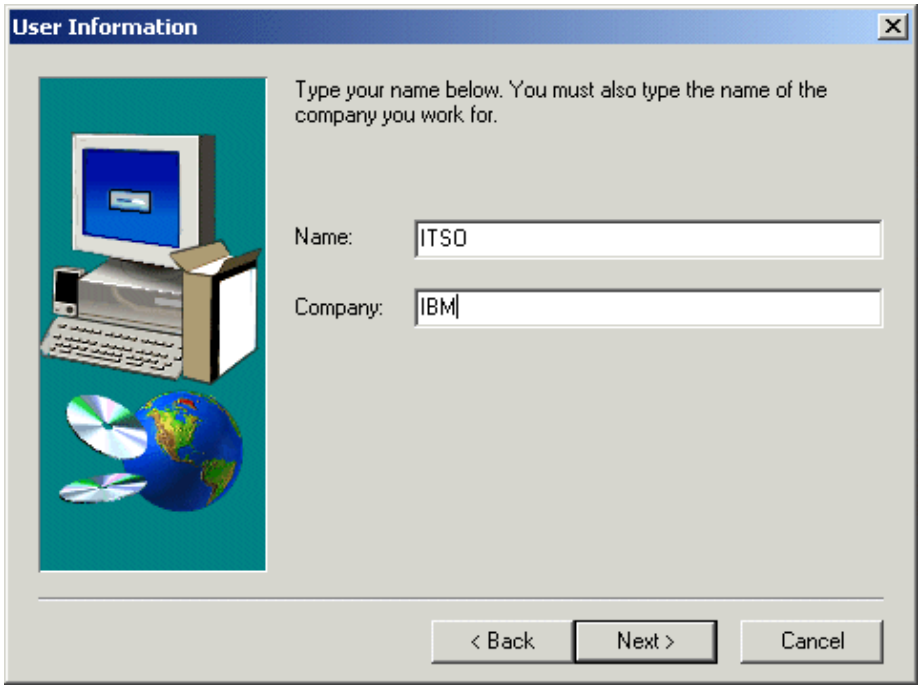



*Figure 5-3 NetVault — User Information*

The screen in Figure 5-4 lets you select the location of the NetVault program files. Please be aware that you will be prompted in a separate screen to enter the location of the NetVault database file.

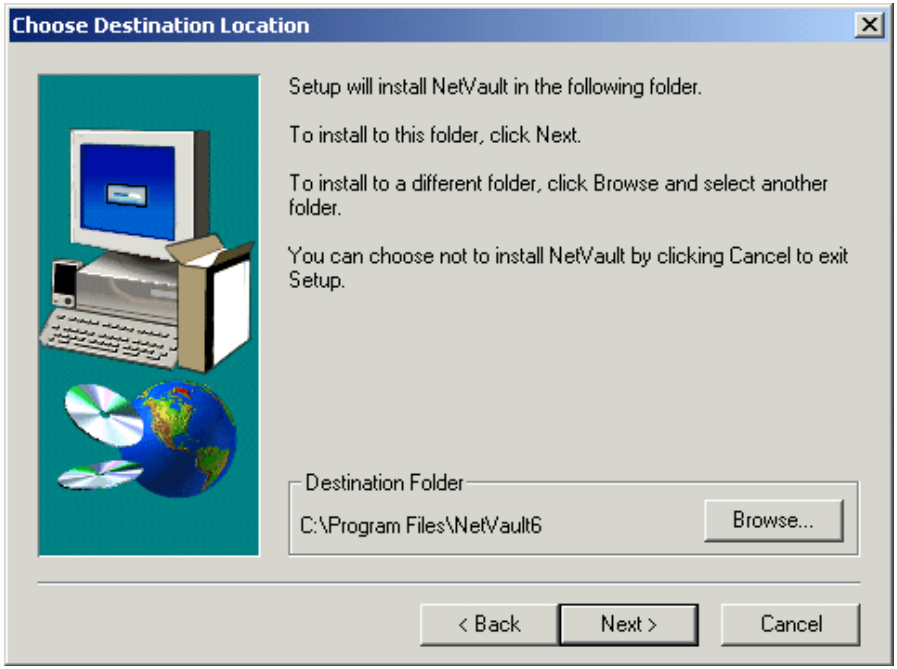

Choose Destination Location
Setup will install NetVault in the following folder.
To install to this folder, click Next.
To install to a different folder, click Browse and select another folder.
You can choose not to install NetVault by clicking Cancel to exit Setup.
Destination Folder
C:\Program Files\NetVault6
Browse...
< Back
Next >
Cancel

*Figure 5-4 NetVault — Program Destination*

After that, you have to specify the database location, as shown in Figure 5-5.

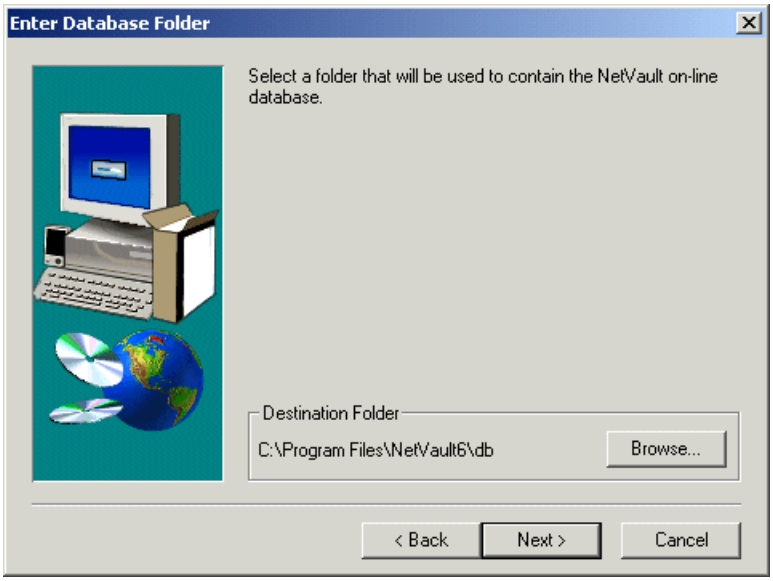



*Figure 5-5 NetVault — Database Location*

In the NetVault Setup Type screen in Figure 5-6, you have to decide which type of setup you want to start. In our case we installed a **NetVault Client System**.

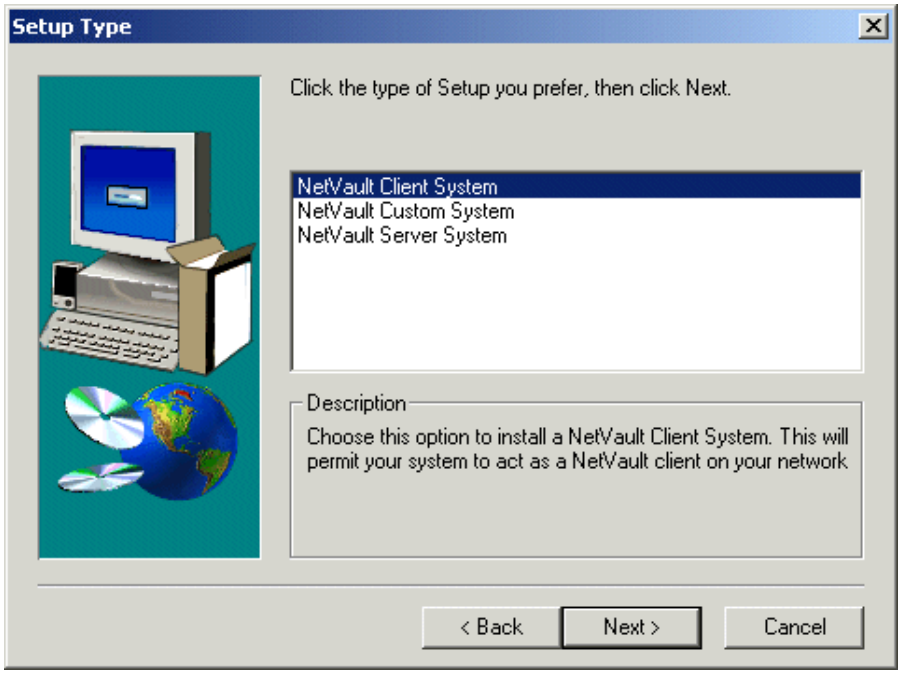

Setup Type
Click the type of Setup you prefer, then click Next.
NetVault Client System
NetVault Custom System
NetVault Server System
Description
Choose this option to install a NetVault Client System. This will permit your system to act as a NetVault client on your network
< Back
Next >
Cancel

*Figure 5-6 NetVault Setup type*

If you plan to attach a tape library to the NAS device to directly transfer data from the NAS system to the tape without using the network, than you would have to choose the **NetVault Custom System** entry. NetVault allows you to back up data locally from the NAS device using the NetVault SmartClient technology. You can also share backup devices in a SAN using the Dynamically Shared Drives (DSD) feature. See Figure 5-7.

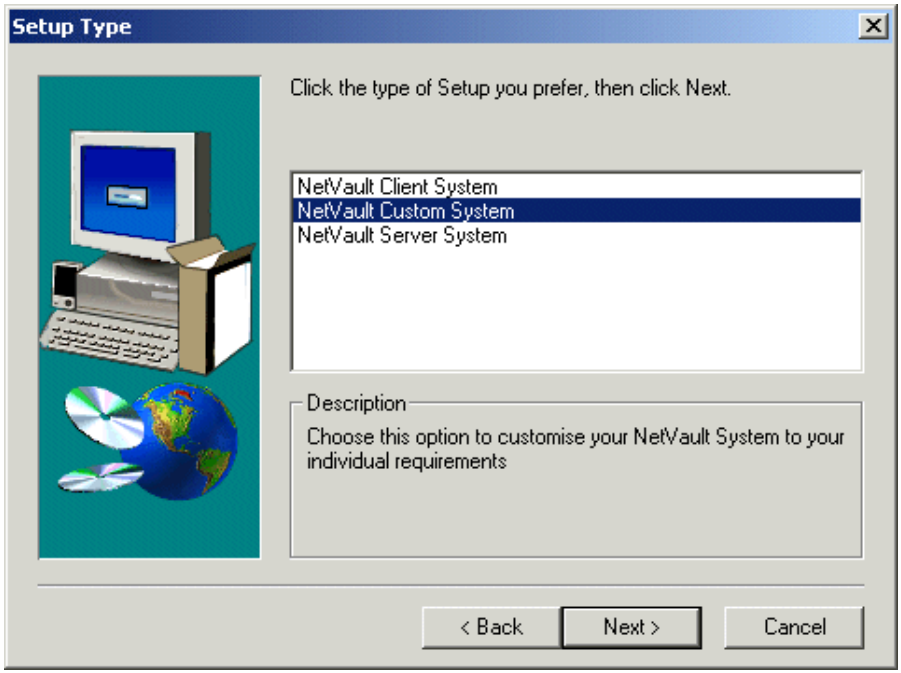

Setup Type
Click the type of Setup you prefer, then click Next.
NetVault Client System
NetVault Custom System
NetVault Server System
Description
Choose this option to customise your NetVault System to your individual requirements
< Back
Next >
Cancel

*Figure 5-7 NetVault Setup Type — Custom System*

If you want to use SmartClient and/or DSD, select **NetVault Custom System** and proceed by choosing **Next**. Otherwise, select **NetVault Client System** and click **Next**. For a NetVault Custom System, select the following items:

- Core files
- NetVault server files
- Device control files
- Data plug-in files
- GUI files
- Help files

Please refer to the NetVault documentation for more information.

After selecting the NetVault client you will be prompted for the name of the client. This name will be used to identify the system in the NetVault domain. It does not have to be the same as the network name of the device, although this typically eases administrative tasks. See Figure 5-8.

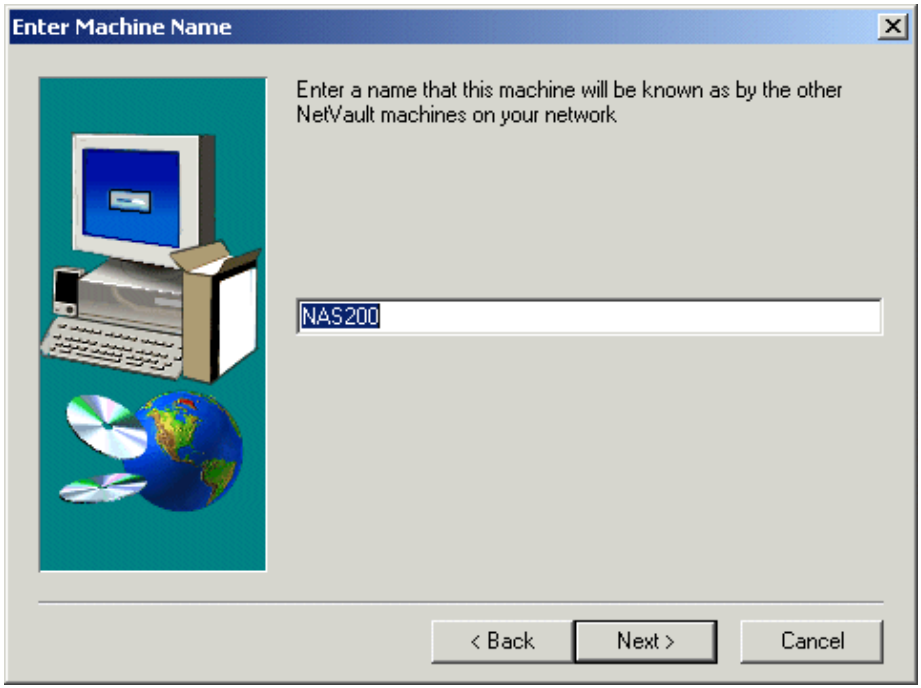

Enter Machine Name
Enter a name that this machine will be known as by the other NetVault machines on your network
NAS200
< Back
Next >
Cancel

*Figure 5-8 NetVault — Enter Machine Name*

After selecting the name for the client you have to provide a password. This password is used to protect the system against unauthorized access from other NetVault systems. As soon as you enter and confirm the password and chose **Next** the setup program starts to copy the NetVault files. See Figure 5-9.

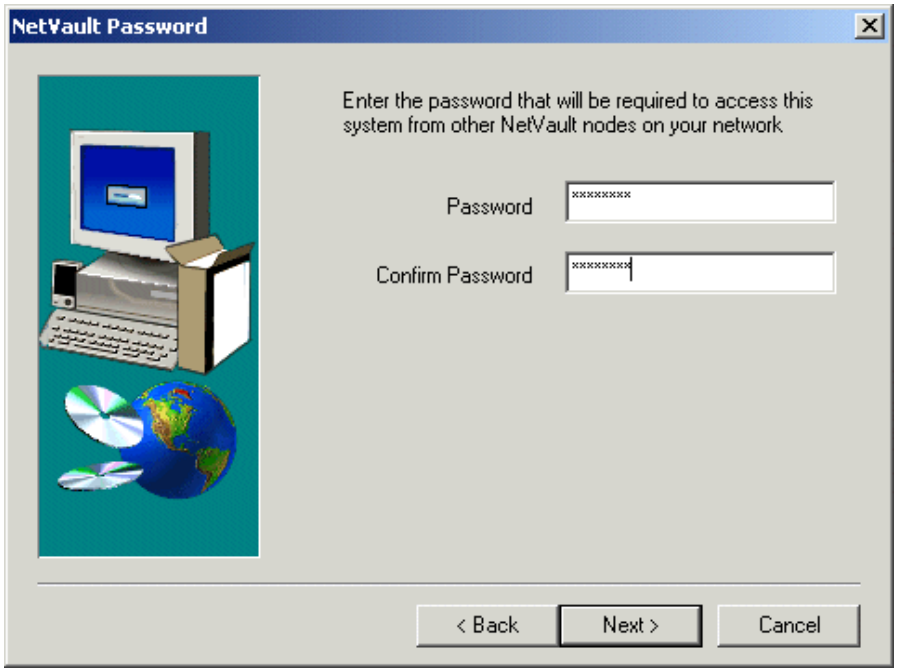

NetVault Password
Enter the password that will be required to access this system from other NetVault nodes on your network
Password
Confirm Password
< Back
Next >
Cancel

*Figure 5-9 NetVault — Enter Password*

When the copy process is finished, you will be informed that the installation is completed. We recommend that you restart the computer before using NetVault. See Figure 5-10.

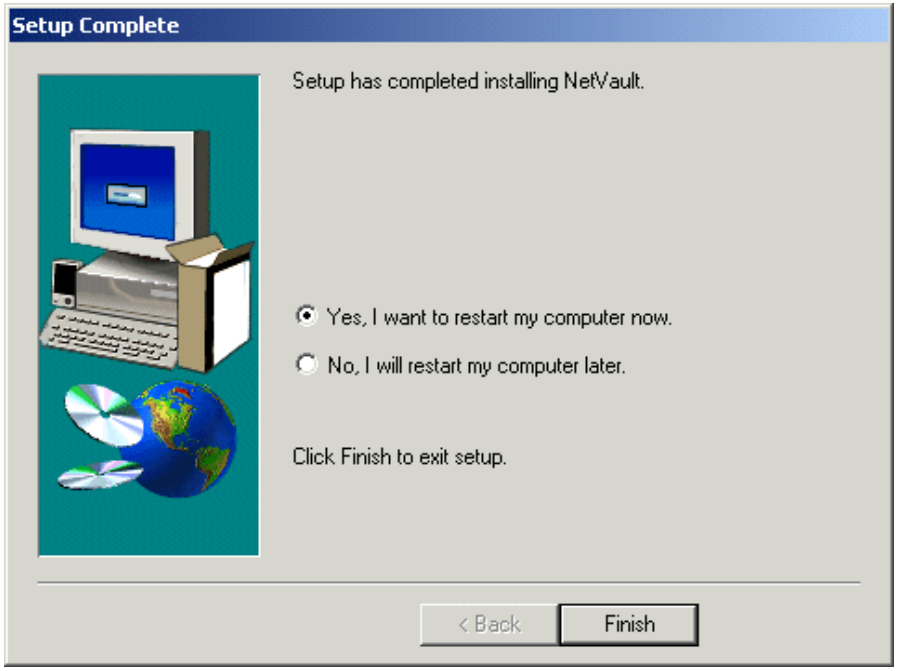

Setup Complete
Setup has completed installing NetVault.
Yes, I want to restart my computer now.
No, I will restart my computer later.
Click Finish to exit setup.
< Back
Finish

*Figure 5-10 NetVault — Setup Complete*

## 5.3 Server configuration

Concerning the server configuration, we assume that you have already set up the NetVault server system and configured your backup device(s). In this section, we show you how to integrate the IBM TotalStorage NAS system into the NetVault client management. The next chapter will explain how to set up a backup job in NetVault.

If you have not yet set up the backup server — do this now. It is a simple and straightforward process similar to the client installation. Then configure the backup device(s) prior to following the steps outlined below.

Start the NetVault GUI by selecting **Start** —> **Programs** —> **NetVault 6** —> **NetVault** from your Windows desktop.

You will see the screen shown in Figure 5-11.

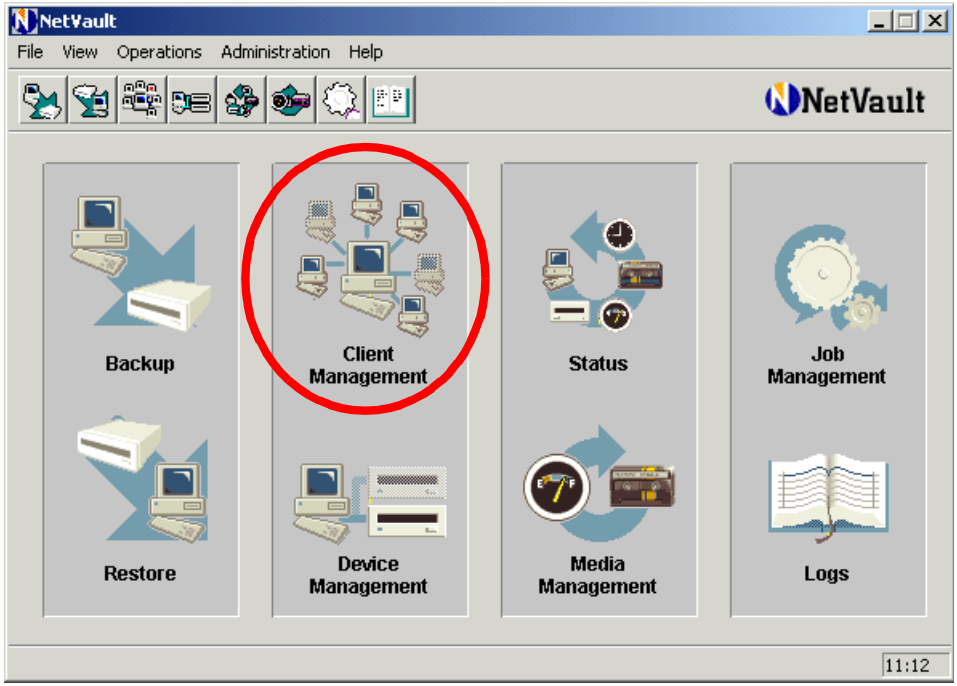



*Figure 5-11 NetVault — Default Screen*

Choose **Client Management**. You should see a screen similar to Figure 5-12.

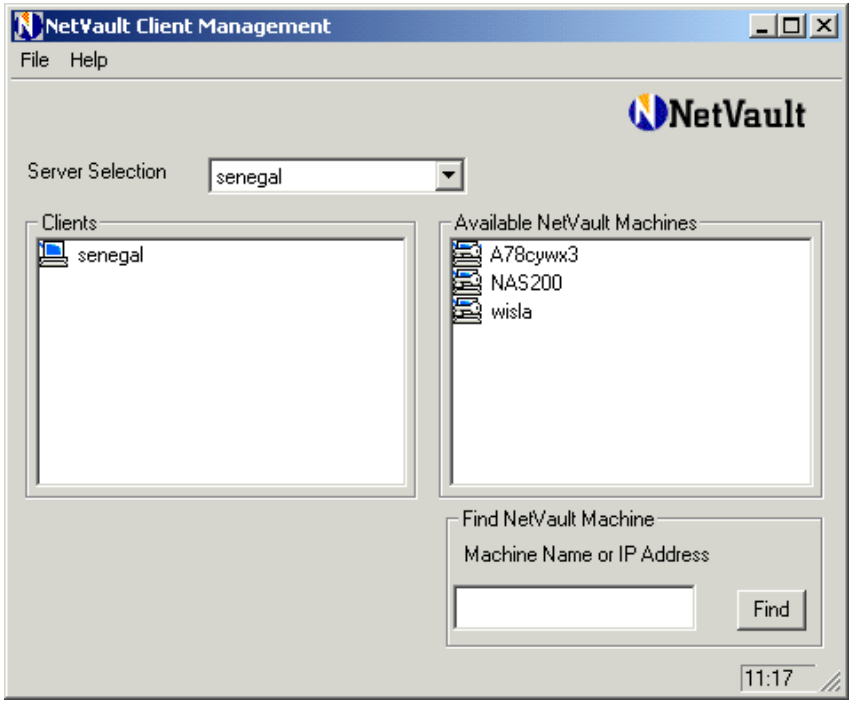



*Figure 5-12 NetVault — client management*

You should see your NetVault server on the left side. If not, go into the main administration interface and select **Administration** —> **Domain Management** to select the NetVault domain (the NetVault server) you want to manage.

The available NetVault machines on the right side are systems that were found but not added to your selected clients yet. Another NetVault server can also be a client.

Select the NAS device you want to manage (for example, NAS200) and add it to the selected clients by double-clicking the icon. NetVault will now prompt you for the system access password that was set during the installation of this client, as shown in Figure 5-13.

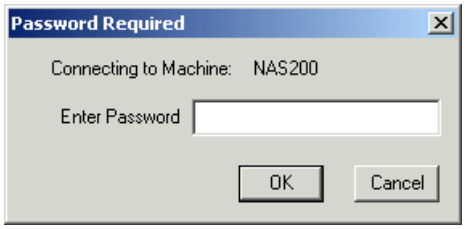



*Figure 5-13 NetVault — System Access Password*

After entering the password and clicking **OK**, NetVault confirms the system access, as shown in Figure 5-14.

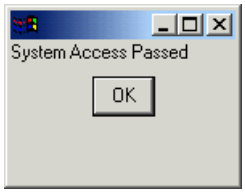



*Figure 5-14 NetVault — System Access Passed*

Click **OK** and the Client Management window will change to something similar to Figure 5-15.

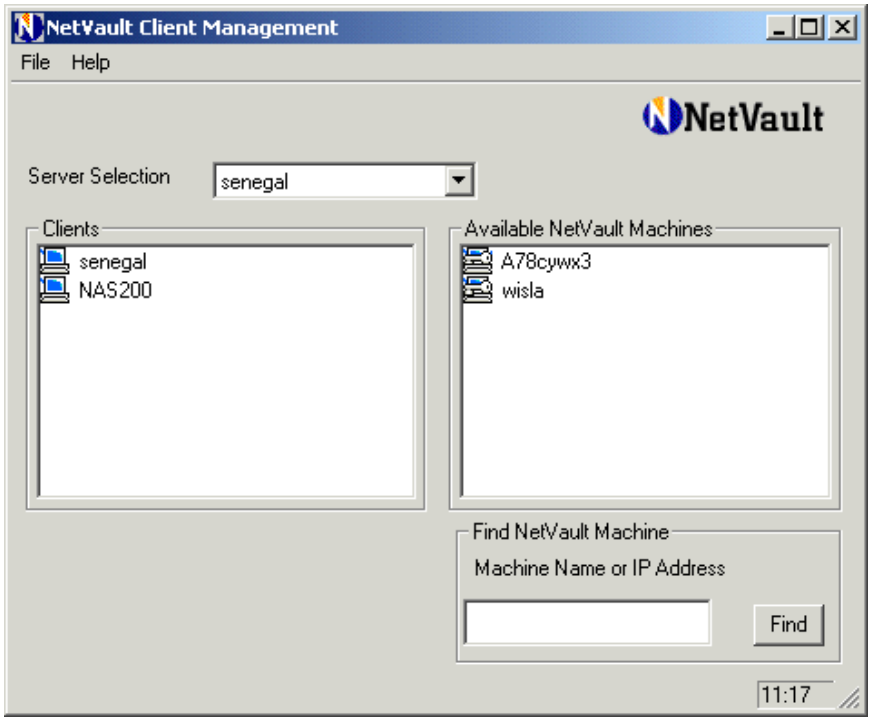



*Figure 5-15 NetVault — Client Management with NAS200*

You will see that after entering the system password the key symbol on the system icon is gone.

Congratulations! You have successfully integrated the IBM TotalStorage NAS device into the NetVault client management.

## 5.4 Starting a backup

In this chapter, we assume that:

- The NetVault client software is installed on the IBM TotalStorage NAS device.
- The NetVault server software is installed and configured on a backup server.
- The IBM TotalStorage NAS device shows in the NetVault client management.
- The NetVault GUI is installed on an administrative system or the GUI on the server or client is used.

**Tip:** To change the NetVault domain (the NetVault server) that is managed from the GUI, select **Administration** —> **Domain Management** from the default screen.

Creating a backup job is easy. From the default NetVault GUI, select **Backup** as shown in Figure 5-16.

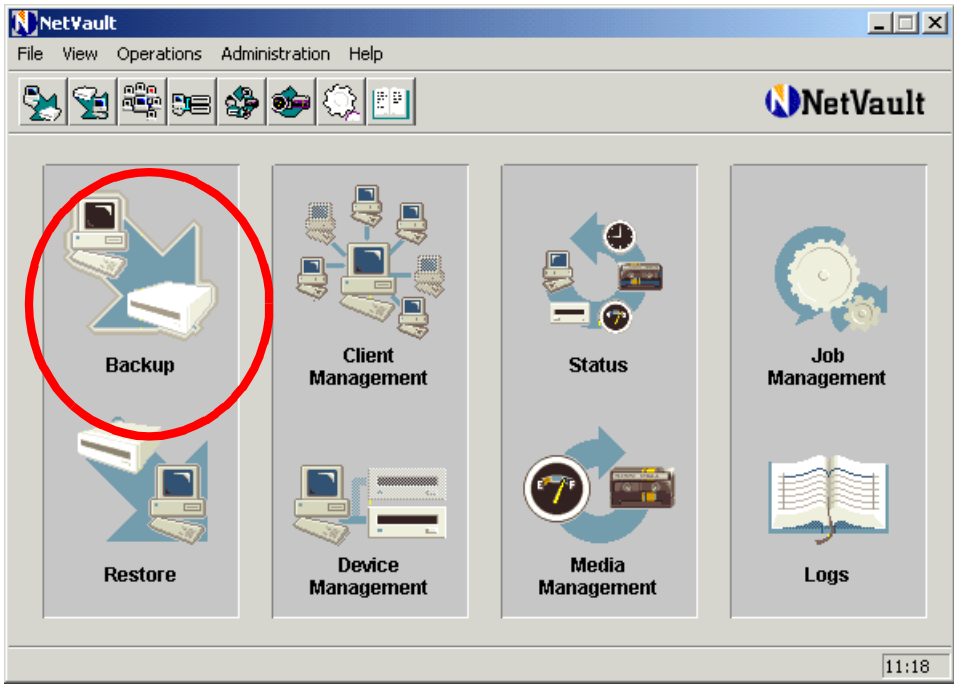



*Figure 5-16 NetVault — Backup*

The default client selection screen will be displayed (Figure 5-17).

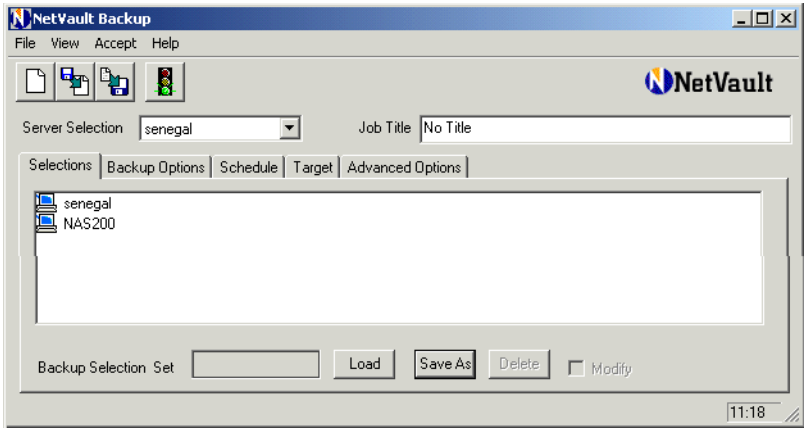



*Figure 5-17 NetVault — client selection*

Select the NAS device from the client selection window. After double-clicking, you will see the plug-in modules that are installed on the client. In our case, the default plug-ins are the file system plug-in and the raw device plug-in. With the raw device plug-in you can select disk drives to back up. We will use the file system plug-in as we want to execute a backup based on files and directories. As soon as you select the file system plug-in, you will see a screen like Figure 5-18.

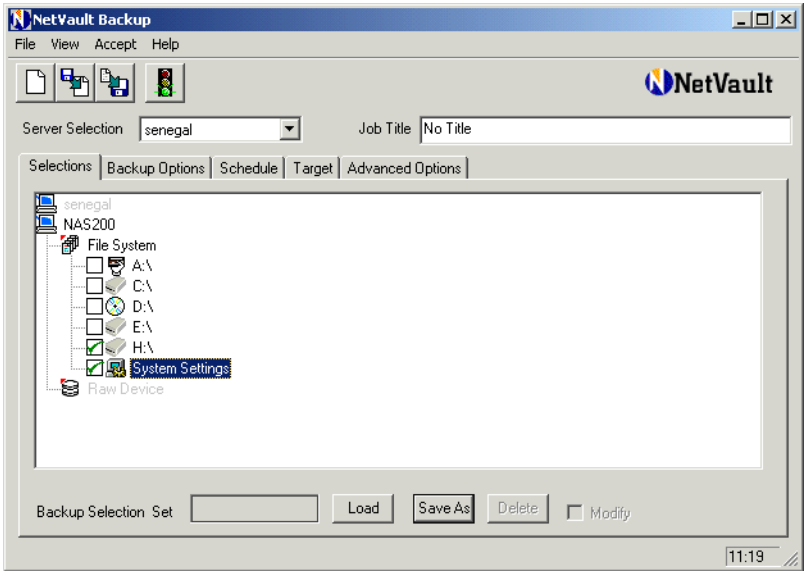



*Figure 5-18 NetVault — file system plug-in*

As an example, we chose to back up the drive H: and the system settings. By clicking the drive letters, you can further select and deselect individual directories and/or files. When you are done with the definition, you can now select the **Backup Options** tab (Figure 5-19).

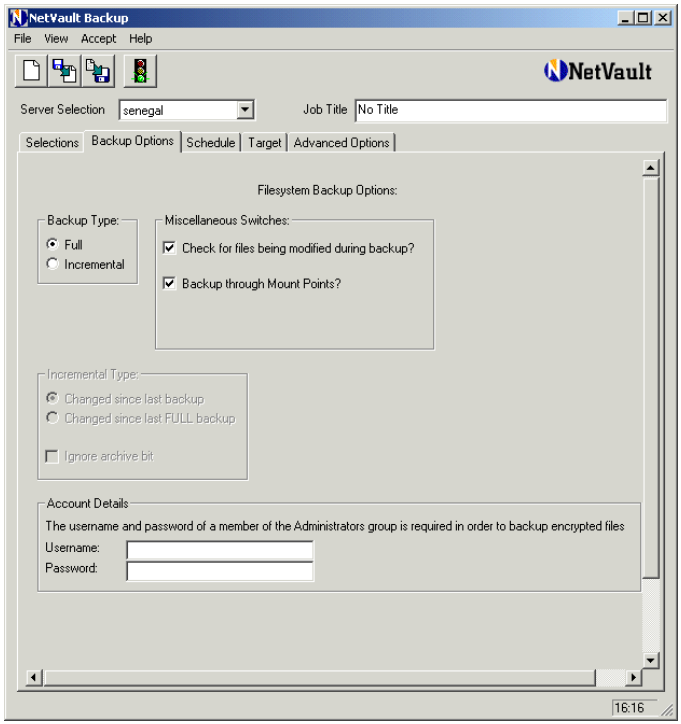



*Figure 5-19 NetVault — file system backup options*

After reviewing the options, you should select the **Schedule** tab (Figure 5-20).

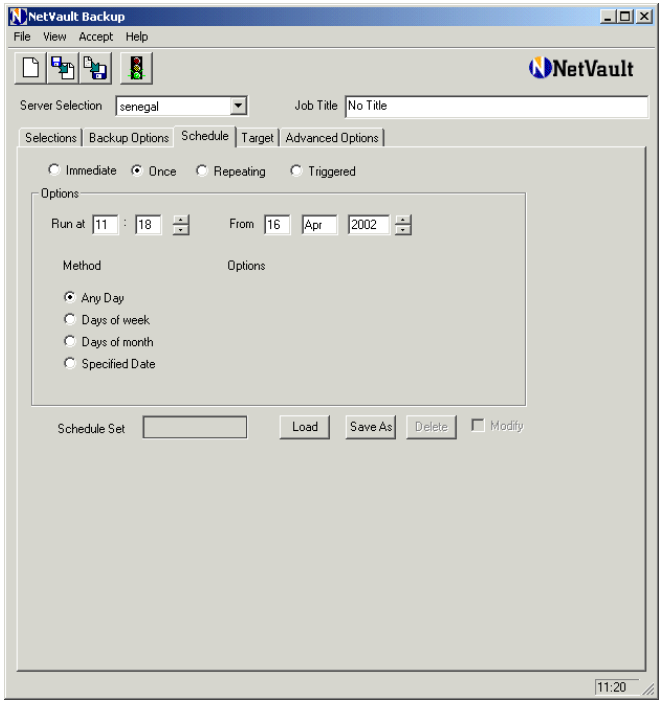



*Figure 5-20 NetVault — backup schedule*

In the **Schedule** tab, you can define when the backup should occur or define a trigger to cause a job execution remotely.

In the target window shown in Figure 5-21, you define the backup target — meaning where the backup data should be written to. This can be another NetVault server or a NetVault SmartClient (NetVault client with attached backup device). Virtual backup devices can also be used.

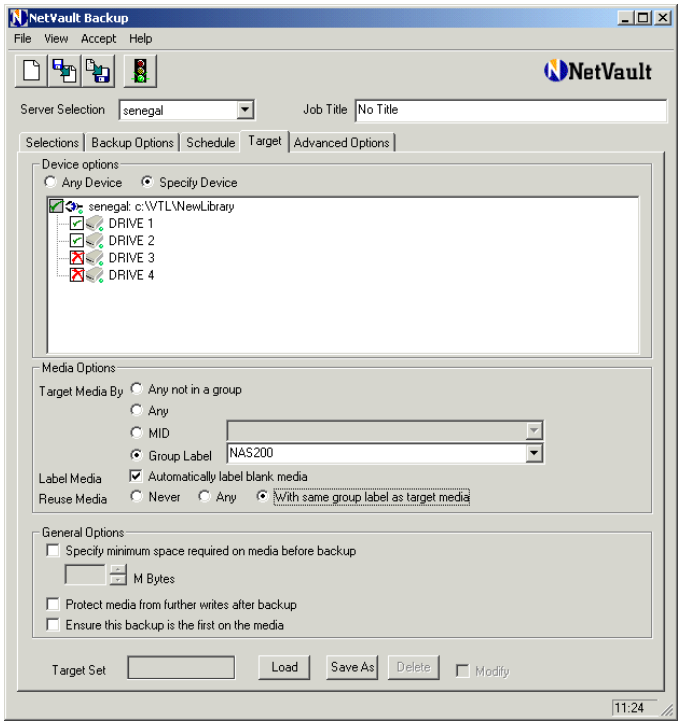



*Figure 5-21 NetVault — backup target*

As an example, we use only two of the four drives of a virtual library on our backup server, senegal. As target media, we use a group label called “NAS200”. This way we identify tapes that are used for this client exclusively. Other options will apply for your environment.

To create group labels, go from the default GUI to NetVault Device Management, right-click the appropriate media, select **Properties**, and enter a Group Label.

Next you can select the **Advanced Options** tab. Here you can define further options like network compression, backup verification and aging. Also on this tab is the duplication setting, which allows you to duplicate a backup set to a backup device on any NetVault server or SmartClient (Figure 5-22).

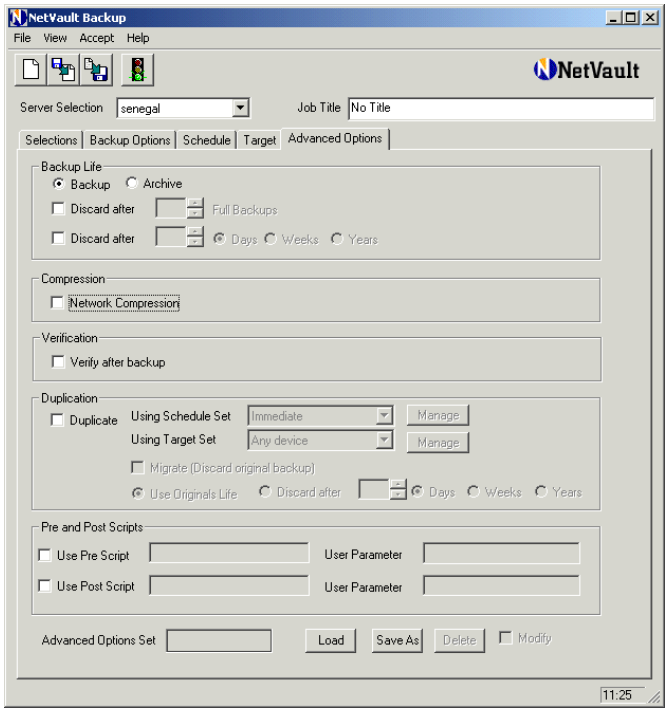



*Figure 5-22 NetVault — Advanced Backup Options*

**Tip:** Enabling network compression will reduce the amount of data transported through your network and may reduce the time needed to transfer data from the backup client to the backup server. On the other hand, network compression adds CPU load on both the client and the server. You will have to evaluate this setting for your specific environment.

When you are done with configuring the backup job, you can select the **Submit** button (the traffic light symbol) or choose **Accept** —> **Submit Backup**. This will submit the backup job. The progress of the job can be monitored in the NetVault Job Management window, as shown in Figure 5-23.

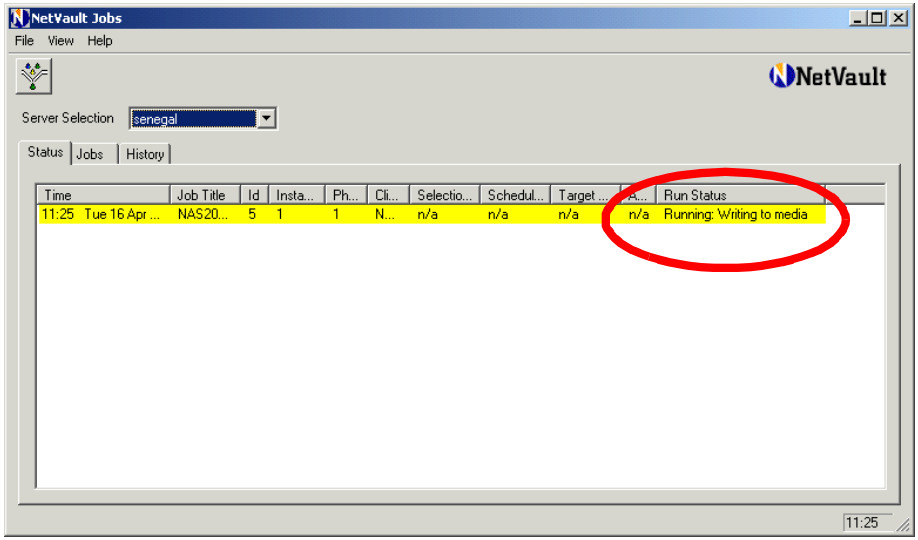



*Figure 5-23 NetVault — Run Status*

Further information can be seen when selecting the job (Figure 5-24).

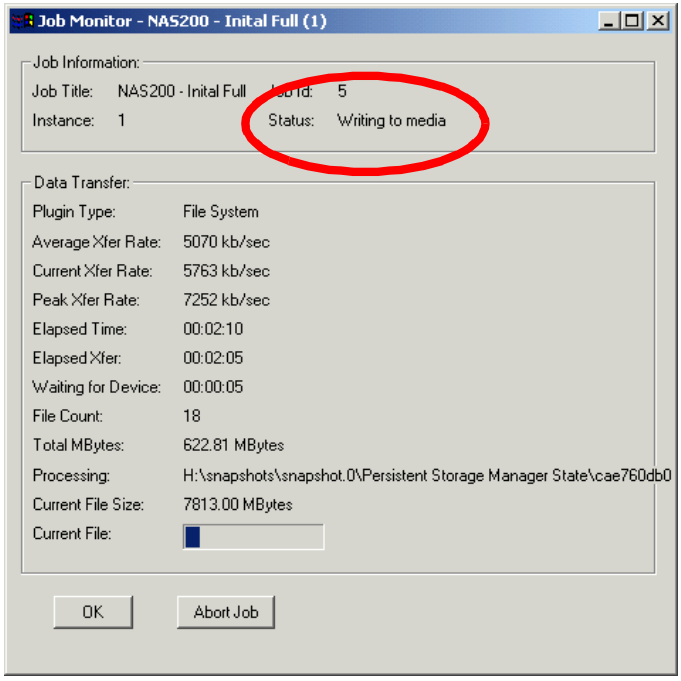



*Figure 5-24 NetVault — Job Monitor*

Another place to look for a status feedback is the device management window, as shown in Figure 5-25.

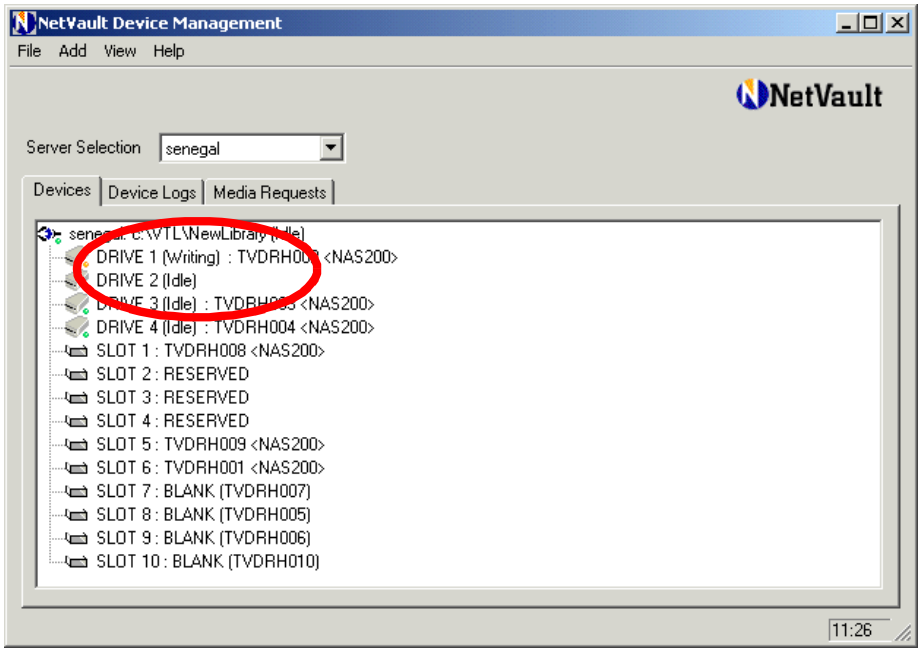



*Figure 5-25 NetVault — Device Management*

Congratulations! The first backup job should now be running.

6

# VERITAS Backup Exec

In this chapter we provide a short overview of VERITAS Backup Exec. We explain how to install and configure the backup client on IBM TotalStorage NAS devices.

© Copyright IBM Corp. 2002

# 6.1 Introduction to Veritas Backup Exec

Veritas Backup Exec is a complete backup solution for environments scaling from workgroup size up to enterprise. It protects data and operating system on the backup client machine, including System State and Active Directory. Specific client agents are available for different groupware applications like Microsoft Exchange and SharePoint Portal Server, Lotus Domino, and databases like Oracle, Microsoft SQL Server and SAP R/3.

IBM TotalStorage NAS appliances do not come preloaded with Veritas Backup Exec client software. However, it has been tested and used to back up and restore the IBM TotalStorage NAS devices. If you already have a Veritas Backup Exec environment set up, it is easy to integrate IBM NAS devices into it.

**Note:** For updates on third party product certification, see the NAS Interoperability List at this site:

http://www.storage.ibm.com/snetwork/nas/nas_interoperability.html

**Important:** There is a known conflict between the Veritas Open File Option and the IBM supplied software; therefore, the Open File Option should not be installed nor used.

During the testing for this chapter, we used the Backup Exec version 8.6. It was a 60-day Evaluation Code with full basic functionality. Here we provide the steps to install the Remote Agent on IBM NAS devices. We do not cover the installation and configuration procedures or the different features of Backup Exec. Before implementing the client installation procedure, we assume that the following prerequisites have been met:

- The Veritas Backup Exec server software is installed and configured on a backup server.
- Veritas Backup Exec server can access the backup device.
- Client device to be backed up is connected to the network and can be accessed from the backup server.

To get more information about Backup Exec and other Veritas product, please see their Web site at:

http://www.veritas.com

## 6.2 Remote Agent installation and configuration

Installation can be done locally on the NAS device, but since IBM TotalStorage NAS appliances are headless devices, a very convenient way of installing a backup client software on them is a push installation method from the Backup Exec server. The procedure is easy and very straightforward. Here are the steps to install the Remote Agent software on IBM TotalStorage NAS devices.

Insert the Backup Exec installation CD into your Backup Exec server's CD drive. The Veritas Backup Exec introductory screen is started automatically, as shown in Figure 6-1.

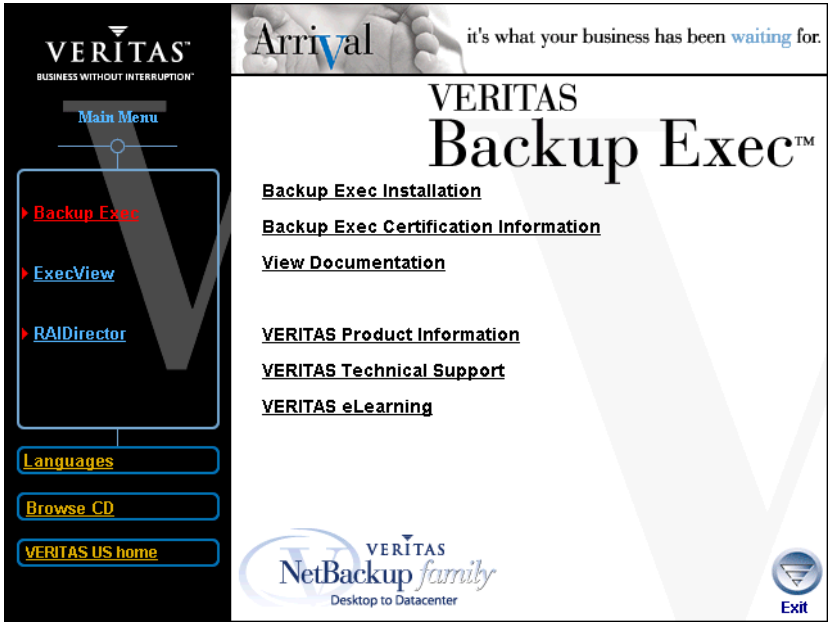



*Figure 6-1 Backup Exec Introduction window*

From this window you can get useful information about the product by clicking the **View Documentation** link. To begin the installation, click the **Backup Exec Installation**, and on the next screen **Start Backup Exec Installation,** as shown in Figure 6-2.

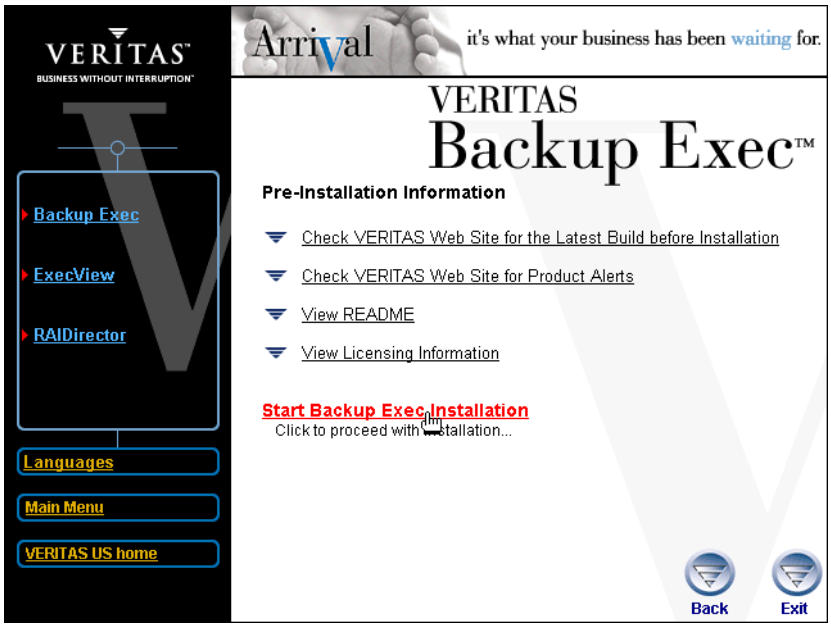



*Figure 6-2 Start Backup Exec Installation*

After clicking **Next** on the Welcome screen, you have to read and agree with the licensing terms. When you are done, proceed with clicking the **Yes** button, as shown in Figure 6-3.

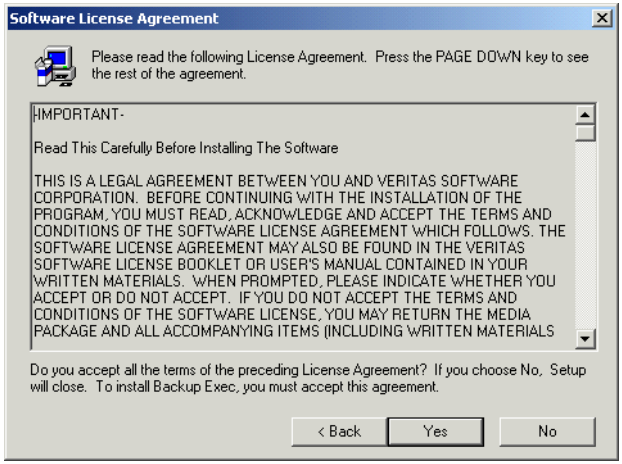

Software License Agreement
Please read the following License Agreement. Press the PAGE DOWN key to see the rest of the agreement.
IMPORTANT-
Read This Carefully Before Installing The Software
THIS IS A LEGAL AGREEMENT BETWEEN YOU AND VERITAS SOFTWARE CORPORATION. BEFORE CONTINUING WITH THE INSTALLATION OF THE PROGRAM, YOU MUST READ, ACKNOWLEDGE AND ACCEPT THE TERMS AND CONDITIONS OF THE SOFTWARE LICENSE AGREEMENT WHICH FOLLOWS. THE SOFTWARE LICENSE AGREEMENT MAY ALSO BE FOUND IN THE VERITAS SOFTWARE LICENSE BOOKLET OR USER'S MANUAL CONTAINED IN YOUR WRITTEN MATERIALS. WHEN PROMPTED, PLEASE INDICATE WHETHER YOU ACCEPT OR DO NOT ACCEPT. IF YOU DO NOT ACCEPT THE TERMS AND CONDITIONS OF THE SOFTWARE LICENSE, YOU MAY RETURN THE MEDIA PACKAGE AND ALL ACCOMPANYING ITEMS (INCLUDING WRITTEN MATERIALS
Do you accept all the terms of the preceding License Agreement? If you choose No, Setup will close. To install Backup Exec, you must accept this agreement.
< Back
Yes
No

*Figure 6-3 Software License Agreement*

If you are not sure about the requirements for installing the Veritas Backup Exec, please read them on the following screen and then proceed by clicking the **Next** button (Figure 6-4).

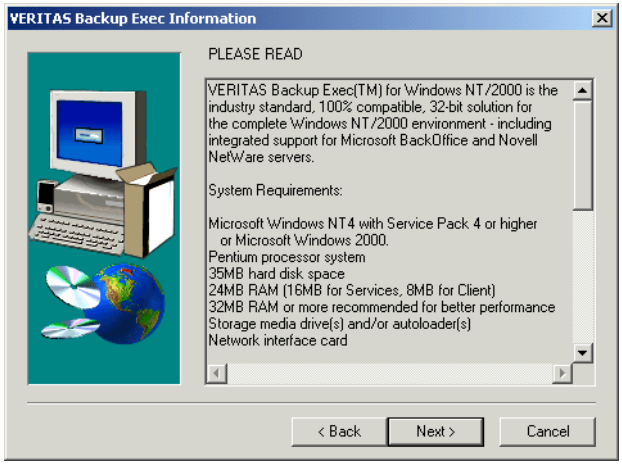

VERITAS Backup Exec Information
PLEASE READ
VERITAS Backup Exec(TM) for Windows NT/2000 is the industry standard, 100% compatible, 32-bit solution for the complete Windows NT/2000 environment - including integrated support for Microsoft BackOffice and Novell NetWare servers.
System Requirements:
Microsoft Windows NT4 with Service Pack 4 or higher or Microsoft Windows 2000.
Pentium processor system
35MB hard disk space
24MB RAM (16MB for Services, 8MB for Client)
32MB RAM or more recommended for better performance
Storage media drive(s) and/or autoloader(s)
Network interface card
< Back
Next >
Cancel

*Figure 6-4 Backup Exec Information*

Now the components selection screen is displayed. For the Remote Agent installation, select **Install Backup Exec options on remote computers**, as shown in Figure 6-5.

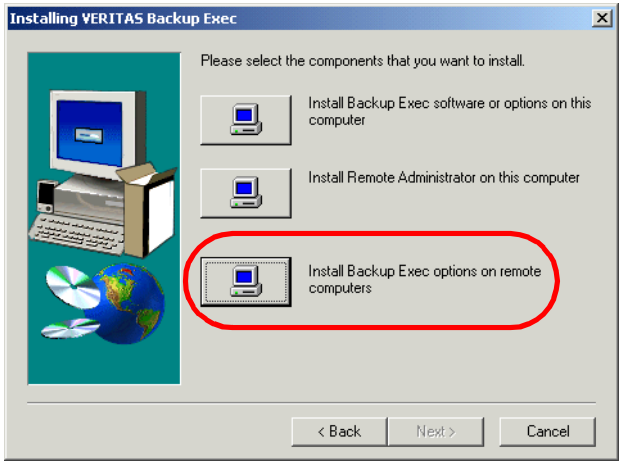

Installing VERITAS Backup Exec
Please select the components that you want to install.
Install Backup Exec software or options on this computer
Install Remote Administrator on this computer
Install Backup Exec options on remote computers
< Back
Next >
Cancel

*Figure 6-5 Backup Exec components selection*

In the next screen you will be asked you for the serial number. For evaluation purposes, you don't need to enter it, and a 60-day Evaluation Version will be installed (Figure 6-6).

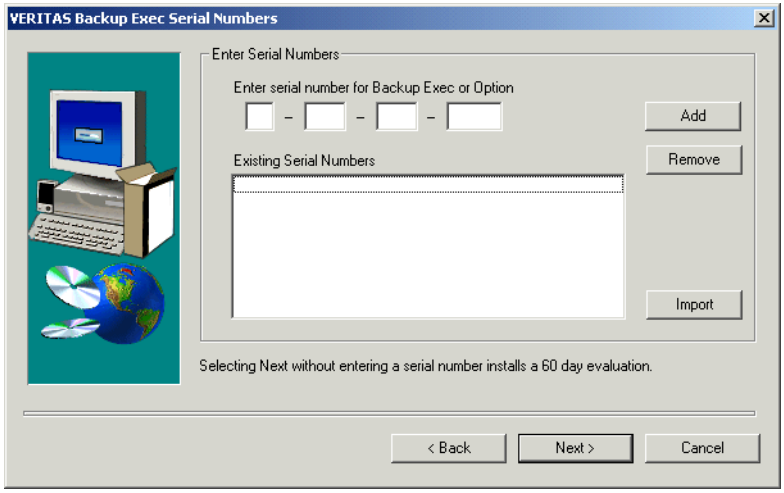



*Figure 6-6 Backup Exec Serial Numbers*

Backup Exec v8.6 provides backup client agents for several different operating systems. For IBM TotalStorage NAS devices, you need to select **Remote Agent for Windows NT/2000** and click **Next**, as shown in Figure 6-7.

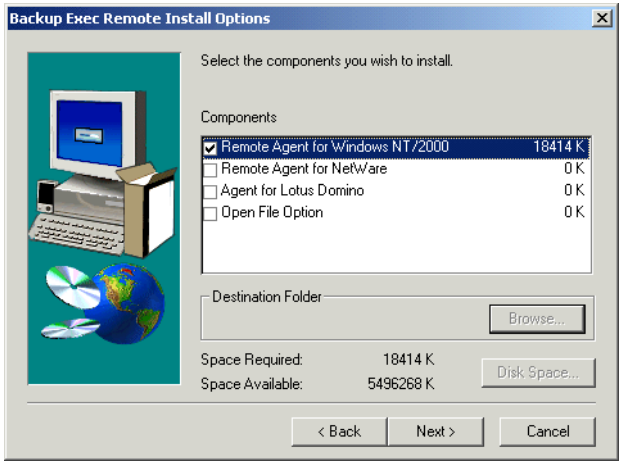



*Figure 6-7 Remote Install Options*

On the following screen, the option to be installed and the installation location will be shown. If you are satisfied with the settings, click **Next** (Figure 6-8).

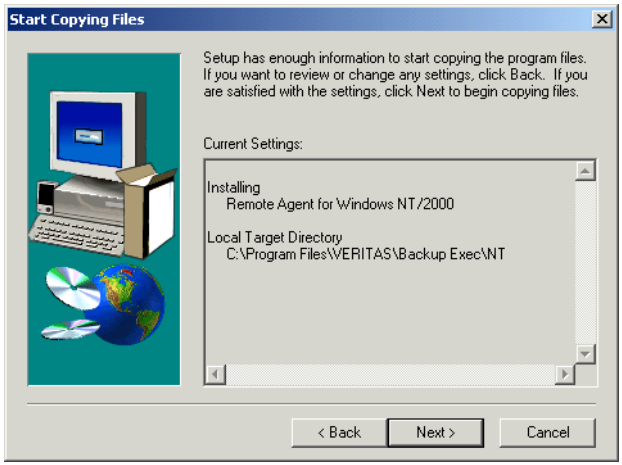

Start Copying Files
Setup has enough information to start copying the program files. If you want to review or change any settings, click Back. If you are satisfied with the settings, click Next to begin copying files.
Current Settings:
Installing
Remote Agent for Windows NT/2000
Local Target Directory
C:\Program Files\VERITAS\Backup Exec\NT
< Back
Next >
Cancel

*Figure 6-8 Start copying*

A Warning window will pop up, informing you about the Service Pack requirements for Windows NT 4.0 operating systems. Confirm it by clicking **OK**, as shown in Figure 6-9.

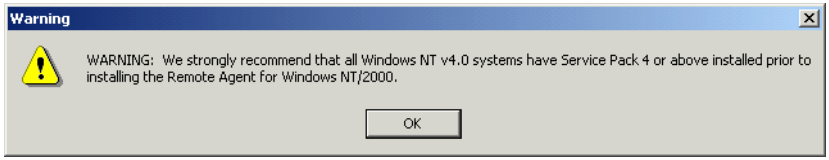

Warning
WARNING: We strongly recommend that all Windows NT v4.0 systems have Service Pack 4 or above installed prior to installing the Remote Agent for Windows NT/2000.
OK

*Figure 6-9 Service Pack 4 Warning*

Now you have to select the system(s) to install Remote Agent. First, choose all domains in which your systems are located (Figure 6-10).

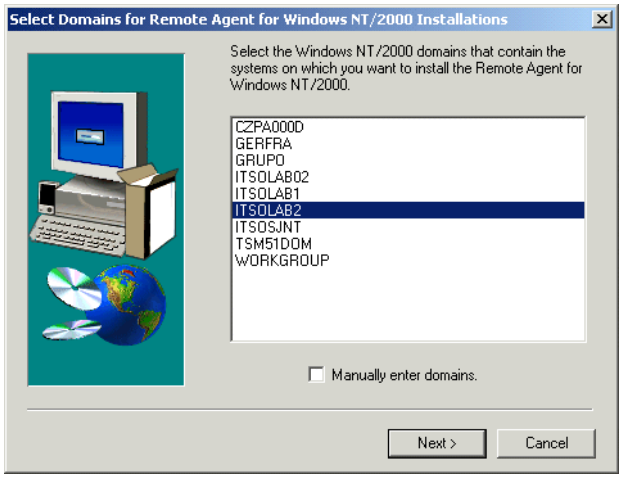



*Figure 6-10 Selecting domains*

Next, select the system name(s), as shown in Figure 6-11.

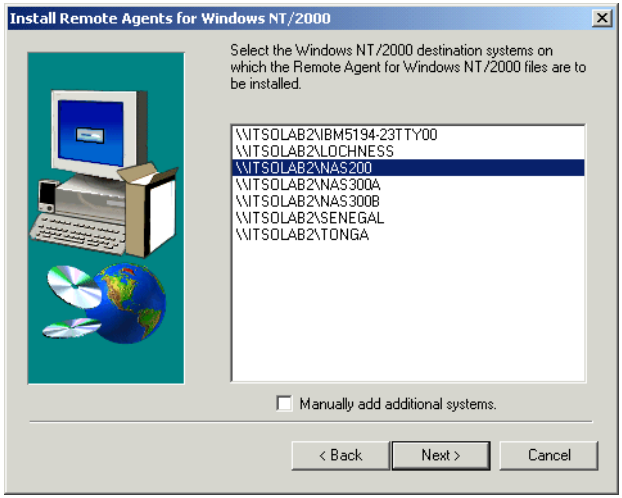



*Figure 6-11 Selecting destination systems*

On the next screen you can preview all selected systems. If you need to add additional ones, click the **Back** button, otherwise proceed by clicking **Next**, as shown in Figure 6-12.

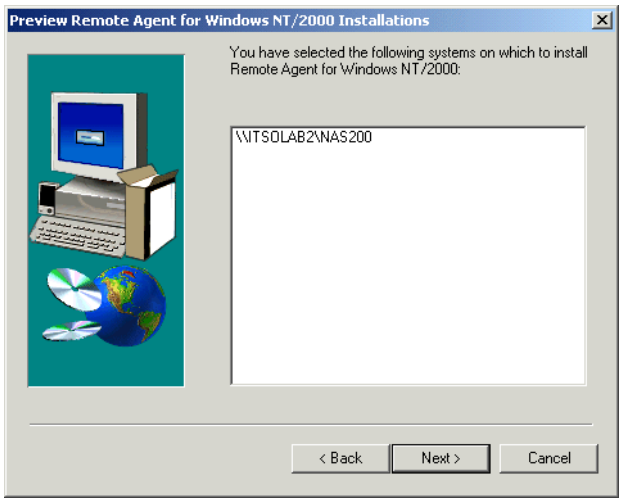

Preview Remote Agent for Windows NT/2000 Installations
You have selected the following systems on which to install Remote Agent for Windows NT/2000:
\\ITSOLAB2\NAS200
< Back
Next >
Cancel

*Figure 6-12 Selected system*

You need to provide the Administrator account and password on the selected system to be able to access it and install the Remote Agent code. Then proceed with the **Next** button (Figure 6-13).

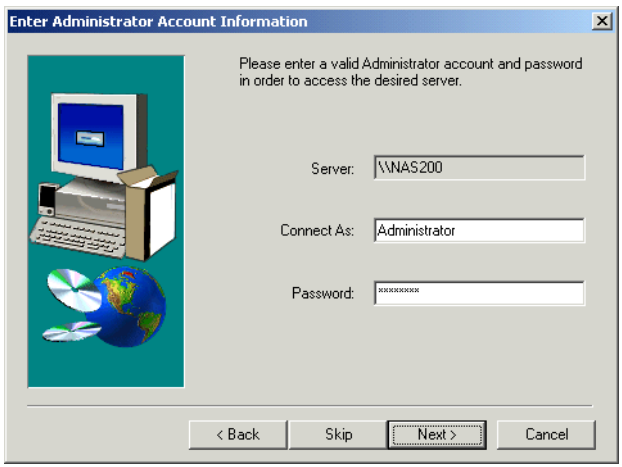



*Figure 6-13 Enter administrator account*

The installation program starts to copy necessary files, as shown in Figure 6-14.

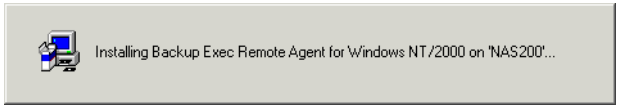



*Figure 6-14 Progress window*

When finished, you will see the Information window. Confirm it it by clicking the **OK** button.

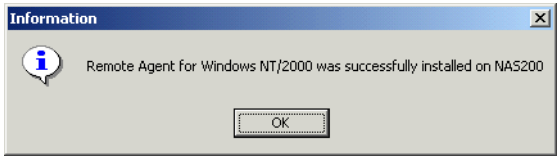



*Figure 6-15 Installation finished*

Before exiting the Setup program, you can review the Readme file for latest information about Backup Exec by clicking the **View Readme file** check box and then exit by selecting **Finish**.

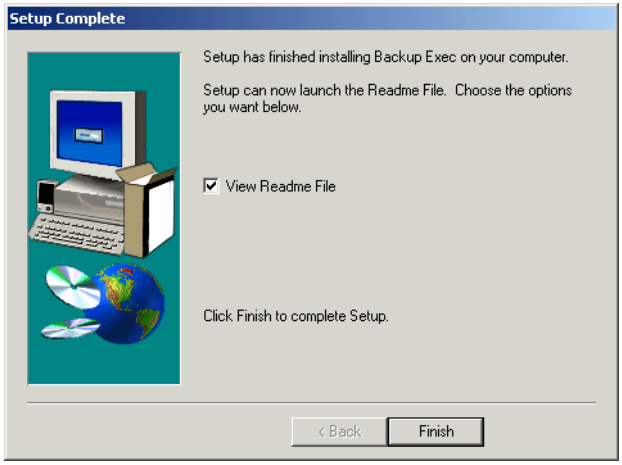

Setup Complete
Setup has finished installing Backup Exec on your computer.
Setup can now launch the Readme File. Choose the options you want below.
View Readme File
Click Finish to complete Setup.
< Back
Finish

*Figure 6-16 Setup Complete*

If you want to verify the installation on the IBM TotalStorage appliance, the Backup Exec files have been installed in the C:\Program Files\VERITAS\Backup Exec\RANT installation folder (Figure 6-17).

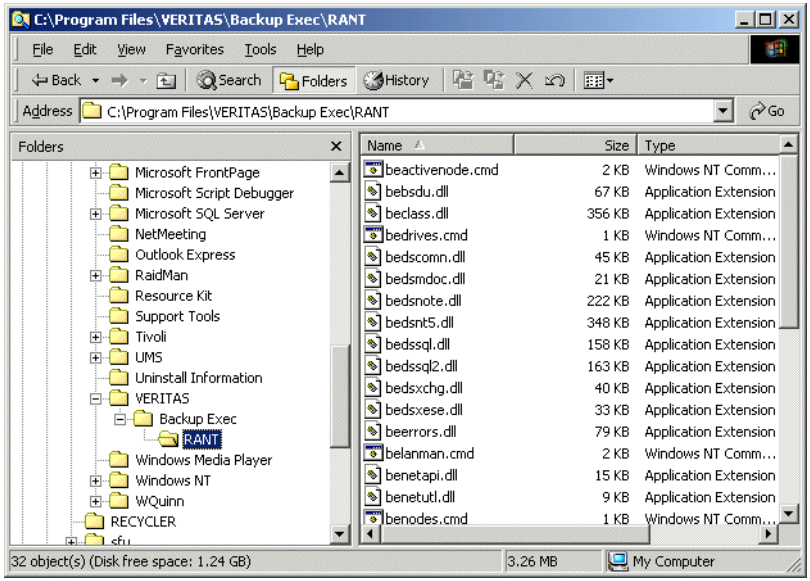



*Figure 6-17 Remote Agent installation folder*

## 6.3 Backup procedure

In this chapter we assume that:

- Veritas Backup Exec server software is installed and configured on a backup server.
- Veritas Backup Exec server can access the backup device.
- Veritas Backup Exec Remote Agent software is installed on the IBM TotalStorage NAS device.
- The IBM TotalStorage NAS device is seen in the Backup Exec Assistant.

To create a backup job, start the Backup Exec Assistant by clicking **Start —> Programs —> VERITAS Backup Exec** on the backup server or any machine with Remote Administrator (Backup Exec administrative GUI) installed. A window similar to the one shown in Figure 6-18 will open.

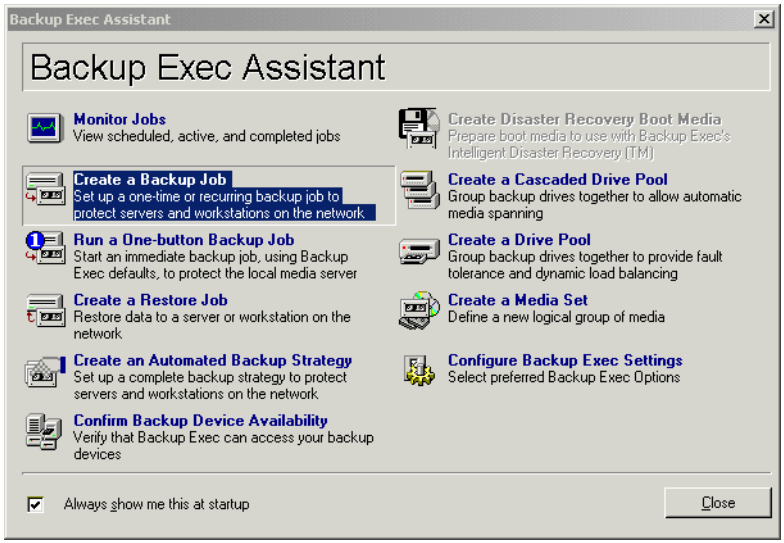

Backup Exec Assistant
Backup Exec Assistant
Monitor Jobs
View scheduled, active, and completed jobs
Create a Backup Job
Set up a one-time or recurring backup job to protect servers and workstations on the network
Run a One-button Backup Job
Start an immediate backup job, using Backup Exec defaults, to protect the local media server
Create a Restore Job
Restore data to a server or workstation on the network
Create an Automated Backup Strategy
Set up a complete backup strategy to protect servers and workstations on the network
Confirm Backup Device Availability
Verify that Backup Exec can access your backup devices
Create Disaster Recovery Boot Media
Prepare boot media to use with Backup Exec's Intelligent Disaster Recovery (TM)
Create a Cascaded Drive Pool
Group backup drives together to allow automatic media spanning
Create a Drive Pool
Group backup drives together to provide fault tolerance and dynamic load balancing
Create a Media Set
Define a new logical group of media
Configure Backup Exec Settings
Select preferred Backup Exec Options
Always show me this at startup
Close

*Figure 6-18 Backup Exec Assistant*

In the Backup Exec Assistant select Create a Backup Job. A Backup Wizard starts (Figure 6-19) and guides you through the following steps.

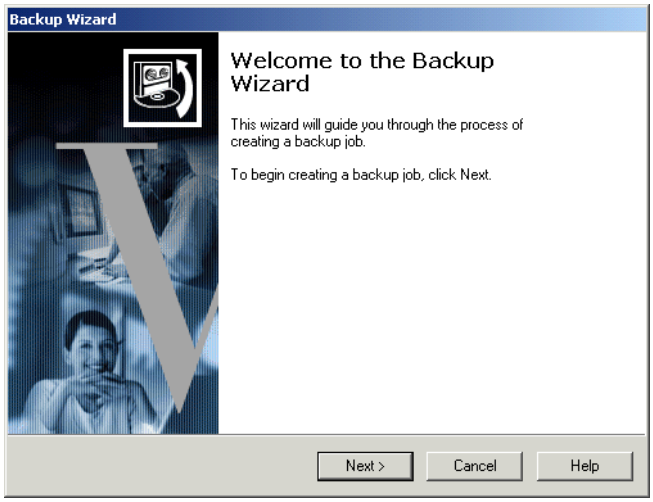

Backup Wizard
Welcome to the Backup Wizard
This wizard will guide you through the process of creating a backup job.
To begin creating a backup job, click Next.
Next >
Cancel
Help

*Figure 6-19 Backup Wizard*

You will be presented with a window, showing a local machine with its drives. Expand the tree below **Remote Selections** and **Microsoft Windows Network** by first choosing the domain and then the machine you want to back up (see Figure 6-20).

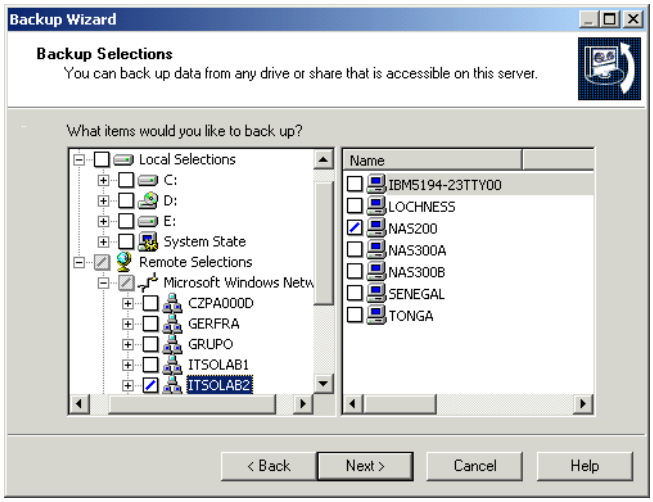



*Figure 6-20 Selecting Remote Machine*

When you select the remote machine, Backup Exec will remind you that Remote Agent has to be installed on Windows 2000 machines to be able to back up their System State (including the Registry). Also, restore operations on Windows 2000 machines have to be done from the Windows 2000-based Backup Exec server.

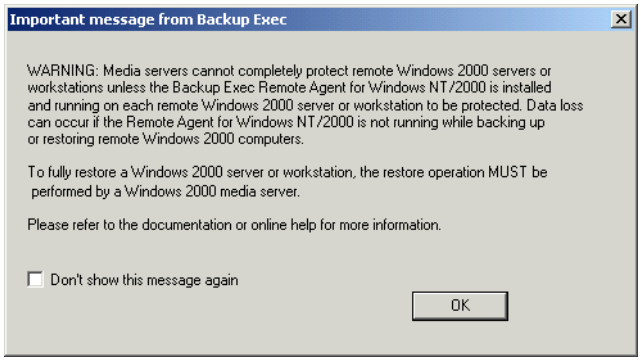

Important message from Backup Exec
WARNING: Media servers cannot completely protect remote Windows 2000 servers or workstations unless the Backup Exec Remote Agent for Windows NT/2000 is installed and running on each remote Windows 2000 server or workstation to be protected. Data loss can occur if the Remote Agent for Windows NT/2000 is not running while backing up or restoring remote Windows 2000 computers.
To fully restore a Windows 2000 server or workstation, the restore operation MUST be performed by a Windows 2000 media server.
Please refer to the documentation or online help for more information.
Don't show this message again
OK

*Figure 6-21 Backup Exec Warning*

Now you can select drives, folders, and files to be backed up by placing a checkmark in front of them, as shown in Figure 6-22. If you select only certain files within a drive, it will be marked with a slash. This means only select files will be backed up, and not the whole drive. If you are backing up a complete system drive, you would probably want to select the **System State** data as well (see Figure 6-22).

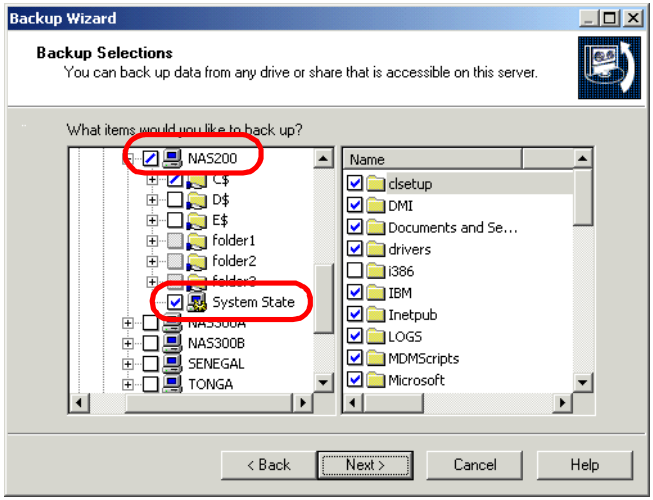



*Figure 6-22 Selecting files*

In the next window, type a name for this backup job and a description of the contents you are backing up (Figure 6-23).

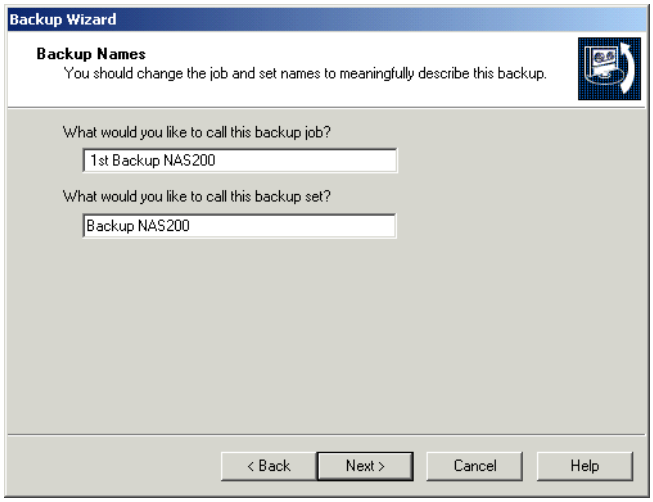

Backup Wizard
Backup Names
You should change the job and set names to meaningfully describe this backup.
What would you like to call this backup job?
1st Backup NAS200
What would you like to call this backup set?
Backup NAS200
< Back
Next >
Cancel
Help

*Figure 6-23 Backup Names*

If the backup devices were successfully installed and recognized, you will be able to choose a backup device in the following window. In our example we used a Backup-to-Disk folder on a local drive. If you are backing to a tape, you can select an available Media Set here (Figure 6-24).

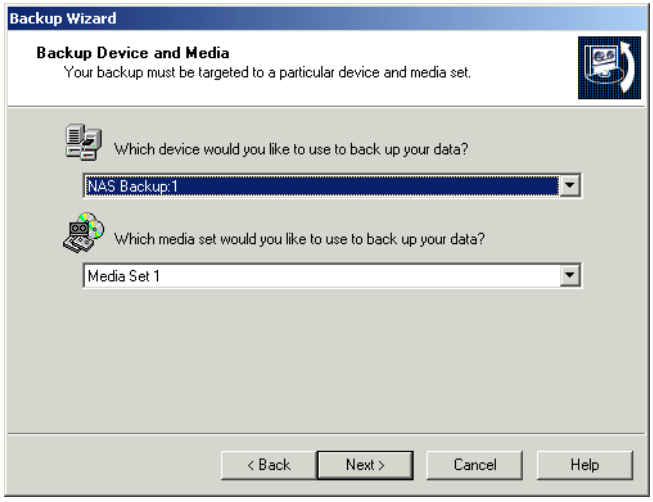

Backup Wizard
Backup Device and Media
Your backup must be targeted to a particular device and media set.
Which device would you like to use to back up your data?
NAS Backup:1
Which media set would you like to use to back up your data?
Media Set 1
< Back
Next >
Cancel
Help

*Figure 6-24 Selecting backup device and media*

If your media already has some data on it, the backup procedure can overwrite it or append new data to it. Select appropriate method of writing new data as shown in Figure 6-25.

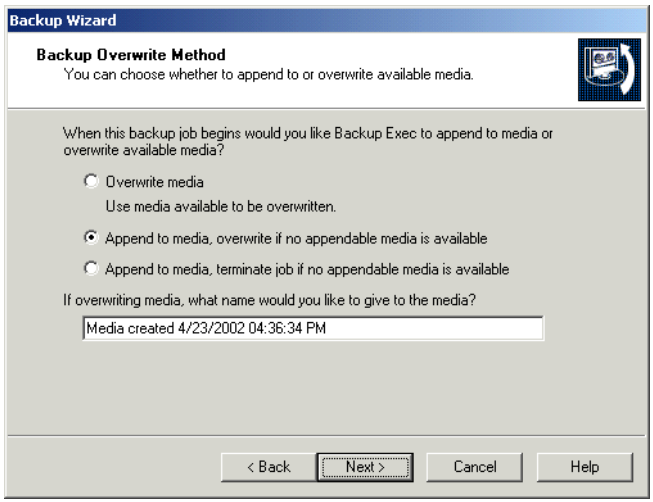

Backup Wizard
Backup Overwrite Method
You can choose whether to append to or overwrite available media.
When this backup job begins would you like Backup Exec to append to media or overwrite available media?
Overwrite media
Use media available to be overwritten.
Append to media, overwrite if no appendable media is available
Append to media, terminate job if no appendable media is available
If overwriting media, what name would you like to give to the media?
Media created 4/23/2002 04:36:34 PM
< Back
Next >
Cancel
Help

*Figure 6-25 Media overwrite method*

Now a backup method has to be chosen. These methods are available:

- Full (backs up all files and resets the archive bit)
- Copy (backs up all files only)
- Differential (backs up changed files only)
- Incremental (backs up changed files and resets the archive bit)
- Daily (backs up files that changed today)
- Working Set (backs up all files last accessed in x-days)

Additionally, you can select a verification of written data after backup is finished. This helps you securing your data by comparing the written data on tape with original data on the backup client (Figure 6-26).

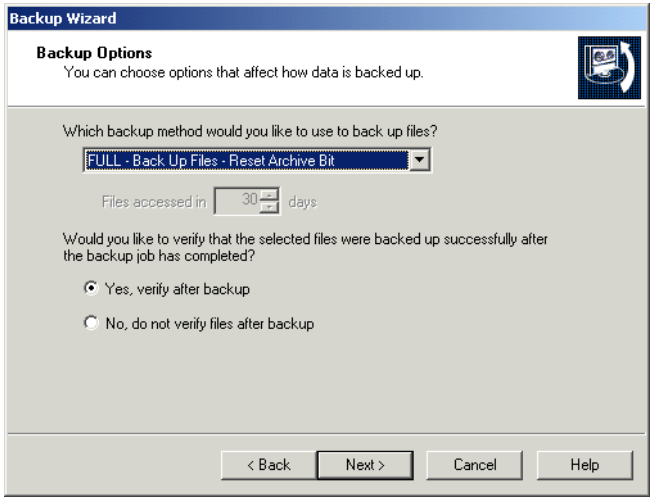

Backup Wizard
Backup Options
You can choose options that affect how data is backed up.
Which backup method would you like to use to back up files?
FULL - Back Up Files - Reset Archive Bit
Files accessed in
30
days
Would you like to verify that the selected files were backed up successfully after the backup job has completed?
Yes, verify after backup
No, do not verify files after backup
< Back
Next >
Cancel
Help

*Figure 6-26 Backup Type and Verification*

Before you finish the Backup Wizard, you have to decide when the job will run. You can start the job immediately by selecting **Yes, run the job now** or schedule it to run later by clicking **No, schedule the job to run later**, as shown in Figure 6-27.

Backup Wizard
Completing the Backup Wizard
You have completed the Backup Wizard and successfully created a backup job.
Do you want to run this backup job now?
Yes, run the job now
No, schedule the job to run later
To close this wizard and run or schedule the job, click Finish.
< Back
Finish
Cancel
Help

*Figure 6-27 Completing the Backup Wizard*

For scheduled execution, you need to provide the start time and date and repeat interval. Then complete the Backup Job setup by clicking the **OK** button (Figure 6-28).

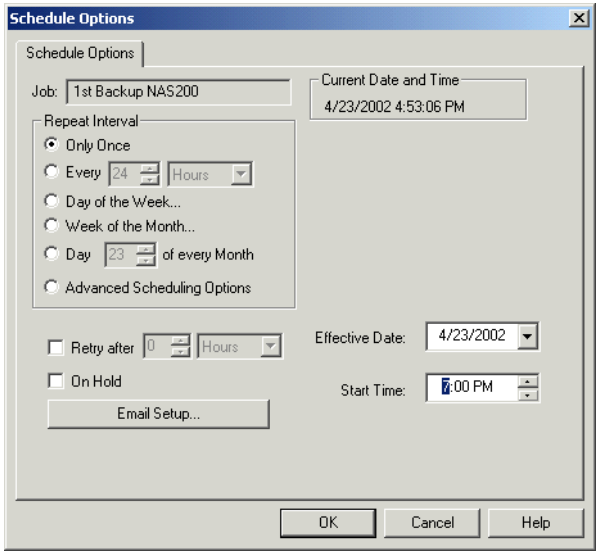



*Figure 6-28 Schedule Options*

## 6.3.1 Monitoring the backup job

If you want to see the progress of the backup job, just click **Monitor Jobs** in the Backup Exec Assistant window, as shown in Figure 6-29.

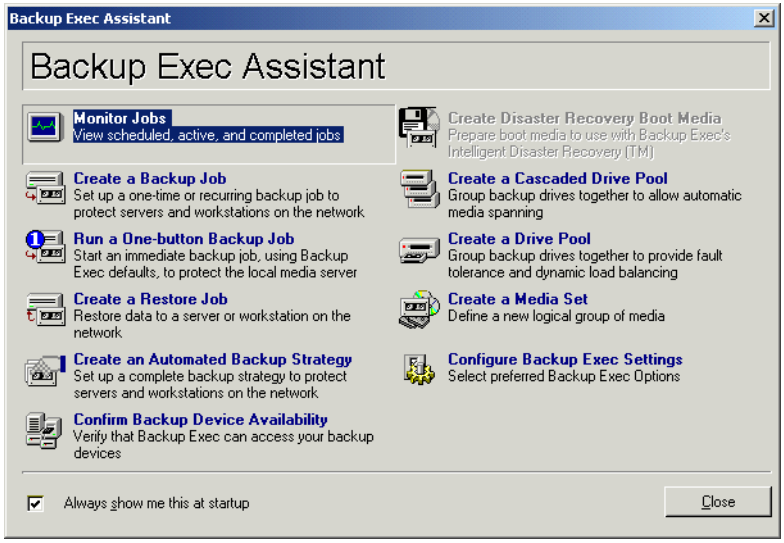

Backup Exec Assistant
Backup Exec Assistant
Monitor Jobs
View scheduled, active, and completed jobs
Create Disaster Recovery Boot Media
Prepare boot media to use with Backup Exec's Intelligent Disaster Recovery (TM)
Create a Backup Job
Set up a one-time or recurring backup job to protect servers and workstations on the network
Create a Cascaded Drive Pool
Group backup drives together to allow automatic media spanning
Run a One-button Backup Job
Start an immediate backup job, using Backup Exec defaults, to protect the local media server
Create a Drive Pool
Group backup drives together to provide fault tolerance and dynamic load balancing
Create a Restore Job
Restore data to a server or workstation on the network
Create a Media Set
Define a new logical group of media
Create an Automated Backup Strategy
Set up a complete backup strategy to protect servers and workstations on the network
Configure Backup Exec Settings
Select preferred Backup Exec Options
Confirm Backup Device Availability
Verify that Backup Exec can access your backup devices
Always show me this at startup
Close

*Figure 6-29 Monitor Jobs*

A new window will open, showing all submitted jobs with their corresponding status. If you need more detailed information about a particular job, right-click it and select **Properties** from the pop-up menu, as shown in Figure 6-30.

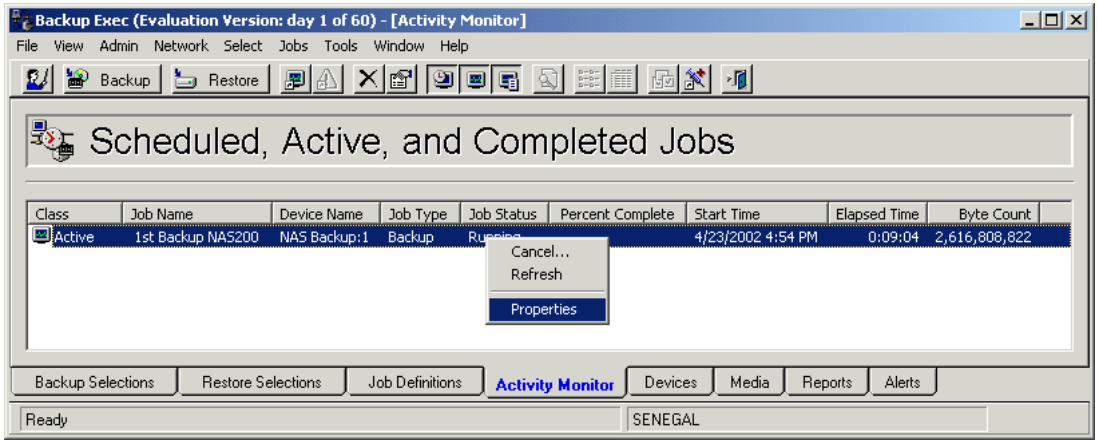



*Figure 6-30 Activity Monitor*

In the Properties window you can see the job progress. It shows the current file an its source and destination. Other information you can also see is the current Throughput Rate in MB/min (Figure 6-31).

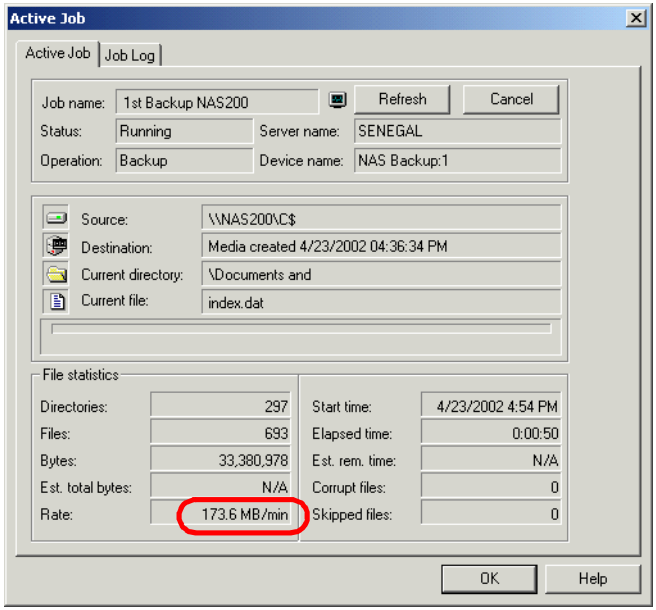



*Figure 6-31 Job Progress*

Backup Exec writes a log for every job executed. You can look at it by clicking the **Job Log** tab, as shown in Figure 6-32.

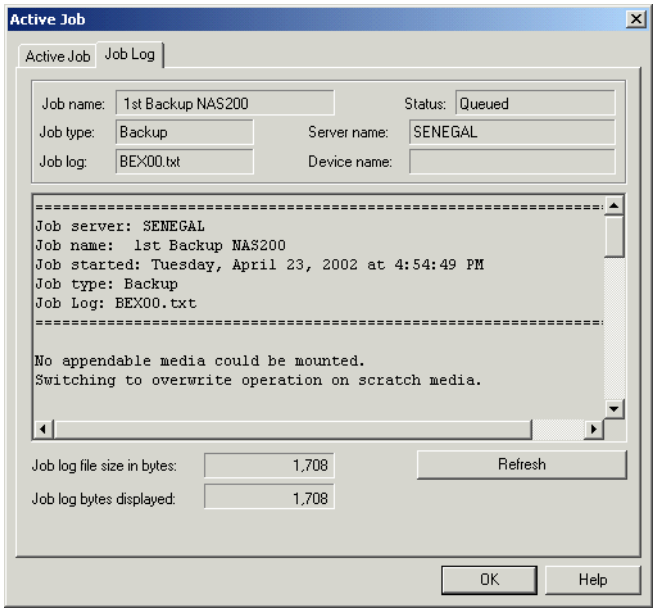



*Figure 6-32 Job Log*

Verification of backed up files will follow the actual writing operation if you selected the **Verify after backup** option (Figure 6-33).

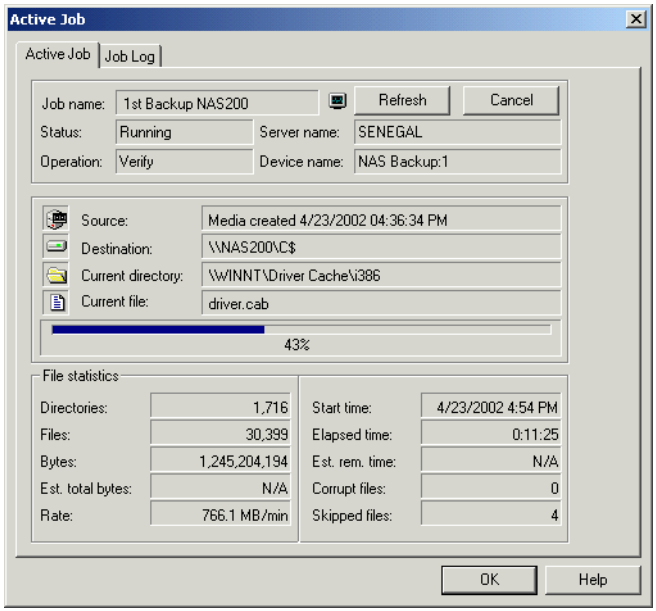



*Figure 6-33 Job Verify progress*

If the verification didn't find any problems, the job will be finished and marked as successful in the activity monitor, as shown in Figure 6-34.

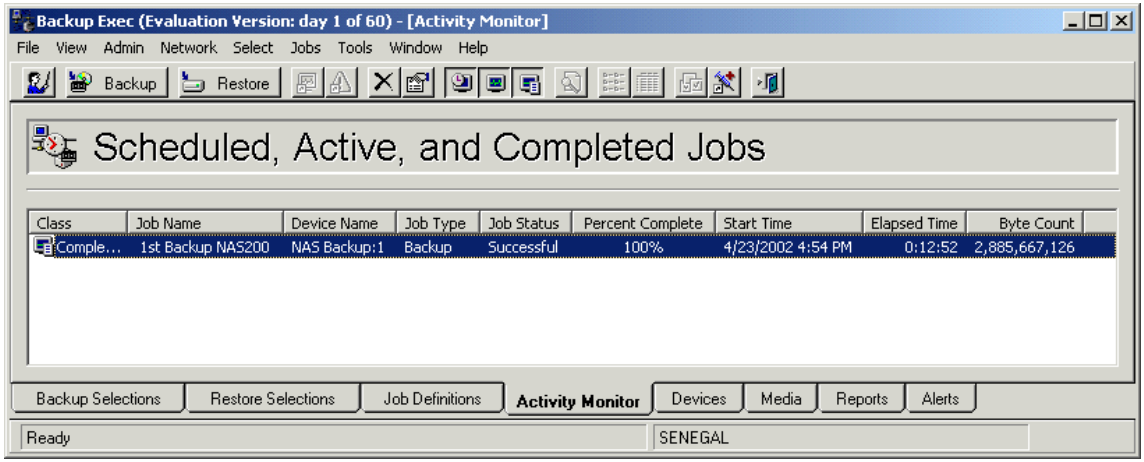



*Figure 6-34 Job Successful*

If you directed the job to the Backup-to-Disk folder on a local drive, you can check the backup file by opening the corresponding folder in Windows Explorer (Figure 6-35).

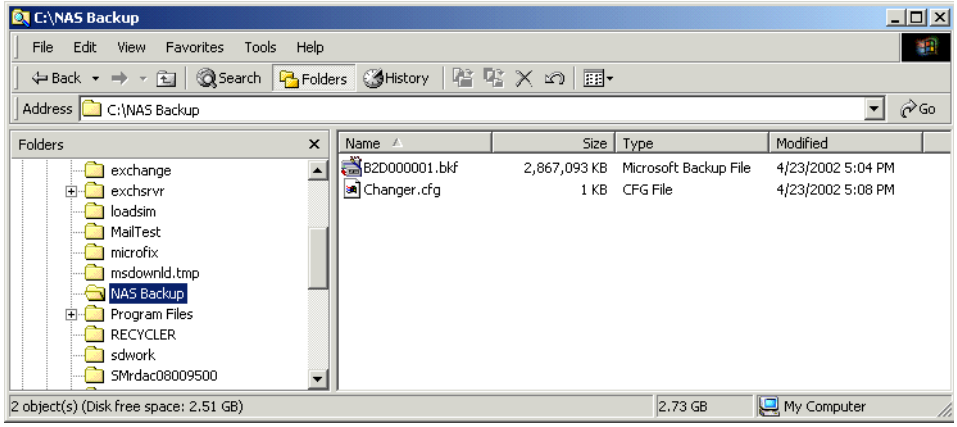



*Figure 6-35 Job on media*

If you followed above mentioned procedure, you should now have a working backup on your media, ready to use it if you need to.

7

# VERITAS NetBackup DataCenter

In this chapter we introduce VERITAS NetBackup DataCenter. We show how to integrate the IBM TotalStorage NAS devices into an existing NetBackup environment.

© Copyright IBM Corp. 2002

## 7.1 Introduction to Veritas NetBackup DataCenter

VERITAS NetBackup DataCenter provides complete platform-independent data protection for the largest UNIX, Windows NT/2000, and NetWare enterprise environments. Global enterprises can access a single, easy-to-use central control site to assure continuity of all aspects of backup and recovery. With a flexible four-tier architecture and database-aware agents and options, VERITAS NetBackup DataCenter effortlessly adapts to the growing needs of any data center.

**Note:** For updates on third party product certification, see the NAS Interoperability List at this site:

http://www.storage.ibm.com/snetwork/nas/nas_interoperability.html

We used NetBackup DataCenter Version 3.4 for our testing.

**Important:** Please be aware that NetBackup *Professional* cannot be used to back up IBM TotalStorage NAS devices.

## 7.2 Agent installation and configuration

Connect to the NAS device either locally or by using the Terminal Services Client.

After inserting the NetBackup DataCenter CD, you will be prompted with a screen similar to Figure 7-1.

*Figure 7-1 NetBackup — autorun screen*

Select the NetBackup Client and click **Install**. This will bring up the Welcome screen as depicted in Figure 7-2.

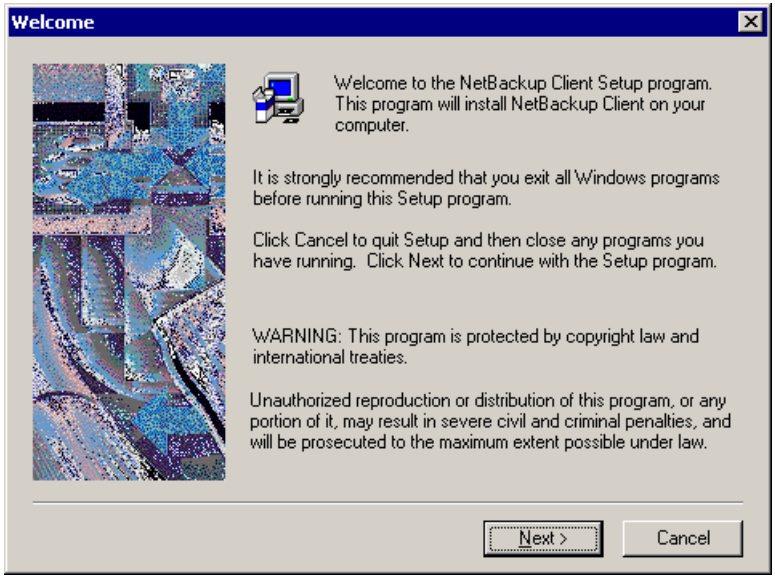

Welcome
Welcome to the NetBackup Client Setup program. This program will install NetBackup Client on your computer.
It is strongly recommended that you exit all Windows programs before running this Setup program.
Click Cancel to quit Setup and then close any programs you have running. Click Next to continue with the Setup program.
WARNING: This program is protected by copyright law and international treaties.
Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.
Next >
Cancel

*Figure 7-2 NetBackup — Welcome*

Click **Next** and make sure that ***Install to this computer only*** is selected in the Client Setup Type screen (Figure 7-3). Click **Next**.

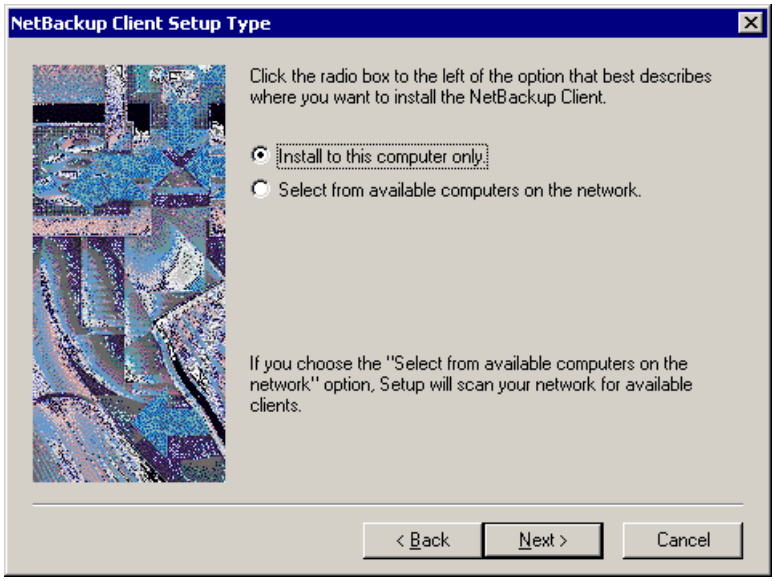

NetBackup Client Setup Type
Click the radio box to the left of the option that best describes where you want to install the NetBackup Client.
Install to this computer only
Select from available computers on the network.
If you choose the "Select from available computers on the network" option, Setup will scan your network for available clients.
< Back
Next >
Cancel

*Figure 7-3 NetBackup — Client Setup Type*

Deselect **OTM** (there are inter operability issues with the IBM TotalStorage NAS OS). Click **Next**.

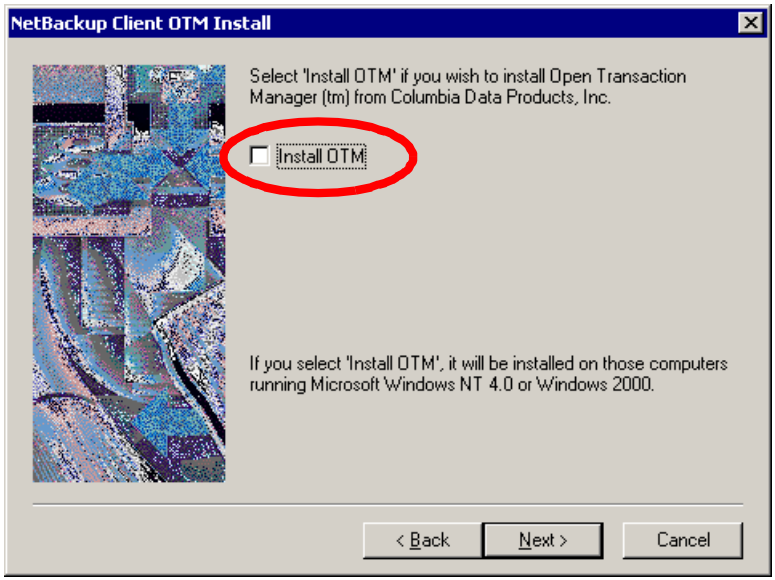

NetBackup Client OTM Install
Select 'Install OTM' if you wish to install Open Transaction Manager (tm) from Columbia Data Products, Inc.
Install OTM
If you select 'Install OTM', it will be installed on those computers running Microsoft Windows NT 4.0 or Windows 2000.
< Back
Next >
Cancel

*Figure 7-4 NetBackup — OTM Install*

Enter the client name and click **Next** (Figure 7-5).

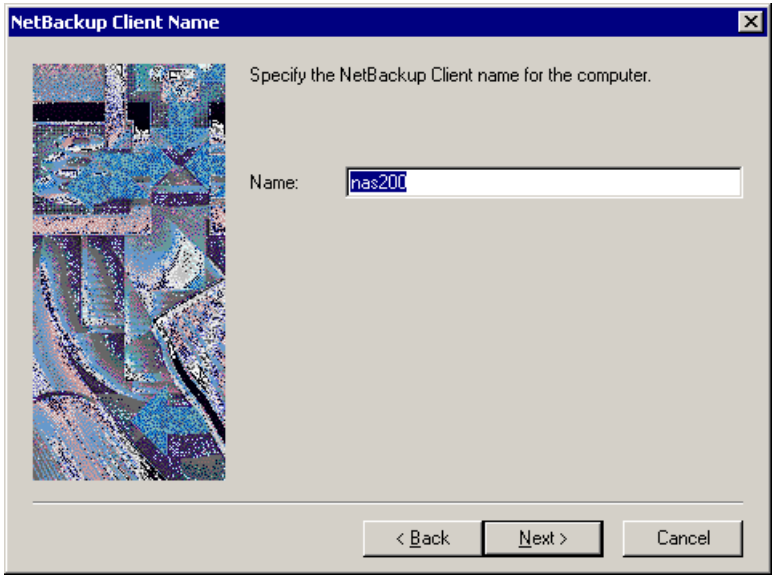



*Figure 7-5 NetBackup — Client Name*

Define the target file location and the program folder (Figure 7-6 and Figure 7-7), and continue by clicking **Next**.

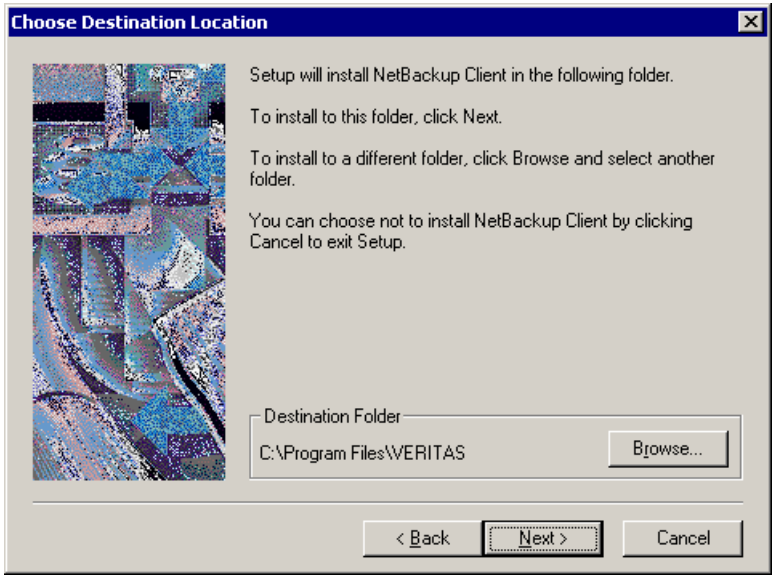

Choose Destination Location
Setup will install NetBackup Client in the following folder.
To install to this folder, click Next.
To install to a different folder, click Browse and select another folder.
You can choose not to install NetBackup Client by clicking Cancel to exit Setup.
Destination Folder
C:\Program Files\VERITAS
Browse...
< Back
Next >
Cancel

*Figure 7-6 NetBackup — Destination Location*

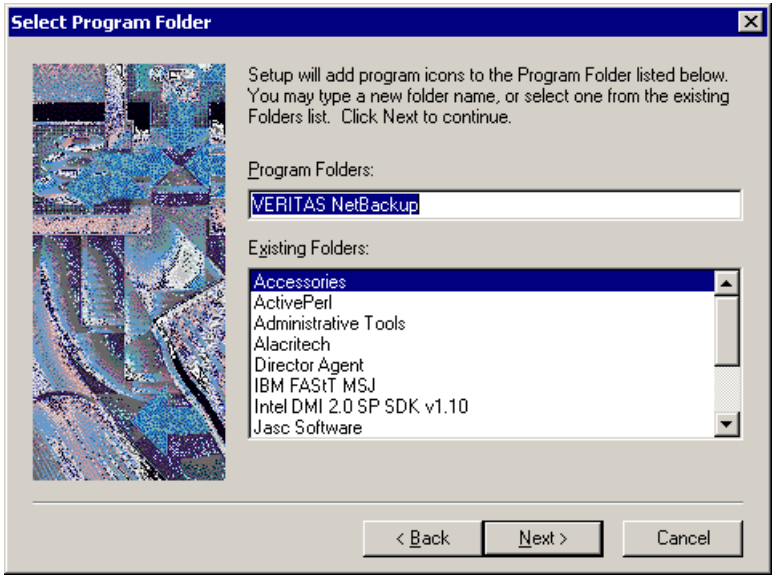

Select Program Folder
Setup will add program icons to the Program Folder listed below. You may type a new folder name, or select one from the existing Folders list. Click Next to continue.
Program Folders:
VERITAS NetBackup
Existing Folders:
Accessories
ActivePerl
Administrative Tools
Alacritech
Director Agent
IBM FAStT MSJ
Intel DMI 2.0 SP SDK v1.10
Jasc Software
< Back
Next >
Cancel

*Figure 7-7 NetBackup — Program Folder*

In the Client Options screen (Figure 7-13) enter the name of the backup server you want to use and click **Add**. Select **Next** when you are done.

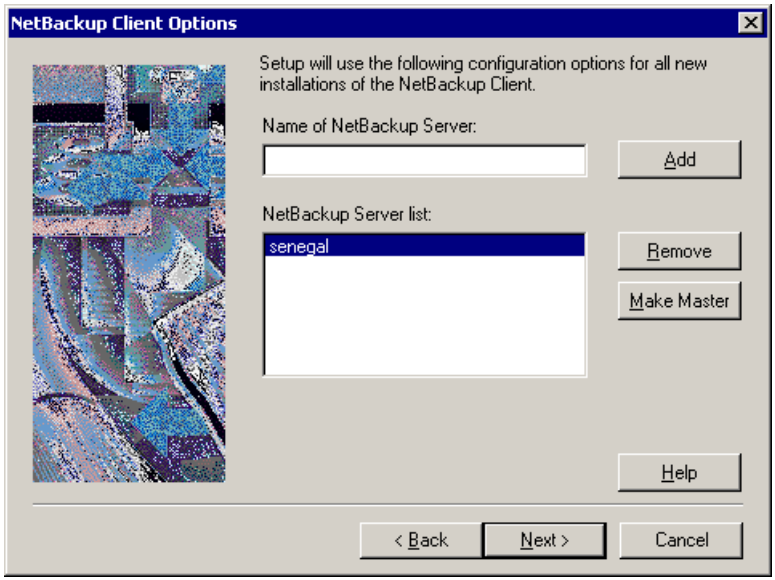



*Figure 7-8 NetBackup — Client Options*

In the following screen (Figure 7-9) configure the additional options if needed, then click **Next**. We used the default values.

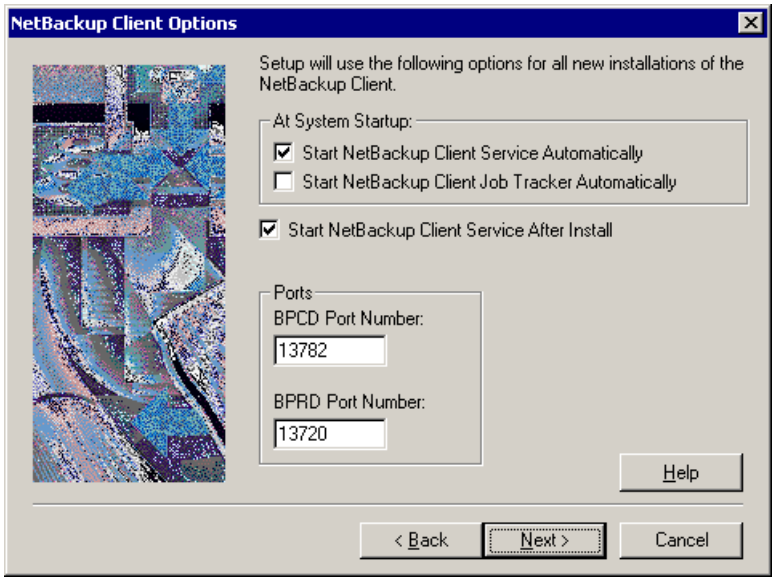



*Figure 7-9 NetBackup — Client Options screen*

In the next screen (Figure 7-10) review your settings, then click **Next**.

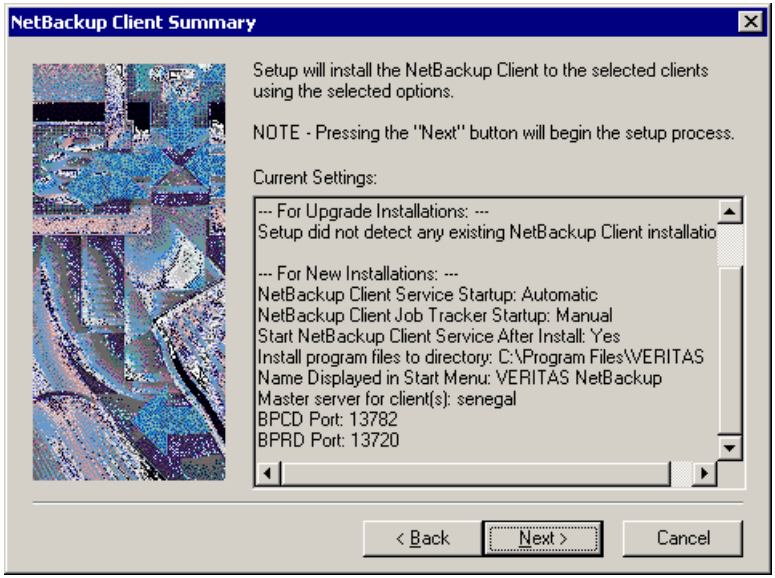

NetBackup Client Summary
Setup will install the NetBackup Client to the selected clients using the selected options.
NOTE - Pressing the "Next" button will begin the setup process.
Current Settings:
--- For Upgrade Installations: ---
Setup did not detect any existing NetBackup Client installatio
--- For New Installations: ---
NetBackup Client Service Startup: Automatic
NetBackup Client Job Tracker Startup: Manual
Start NetBackup Client Service After Install: Yes
Install program files to directory: C:\Program Files\VERITAS
Name Displayed in Start Menu: VERITAS NetBackup
Master server for client(s): senegal
BPCD Port: 13782
BPRD Port: 13720
< Back
Next >
Cancel

*Figure 7-10 NetBackup — Client Summary*

The installation programs starts copying files now. Then the Install Summary screen is displayed (Figure 7-11). Click **Next**.

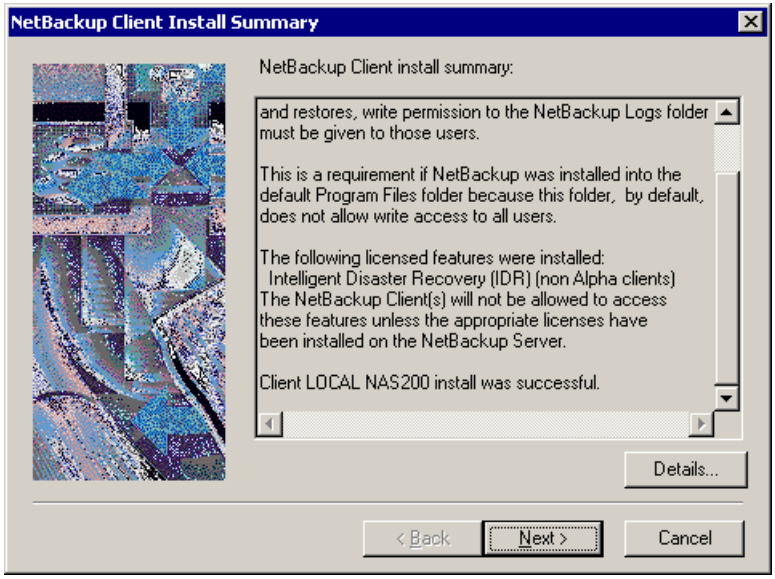

NetBackup Client Install Summary
NetBackup Client install summary:
and restores, write permission to the NetBackup Logs folder must be given to those users.
This is a requirement if NetBackup was installed into the default Program Files folder because this folder, by default, does not allow write access to all users.
The following licensed features were installed:
Intelligent Disaster Recovery (IDR) (non Alpha clients)
The NetBackup Client(s) will not be allowed to access these features unless the appropriate licenses have been installed on the NetBackup Server.
Client LOCAL NAS200 install was successful.
Details...
< Back
Next >
Cancel

*Figure 7-11 NetBackup — Install Summary*

Now confirm the installation by selecting **Finish** (Figure 7-12).

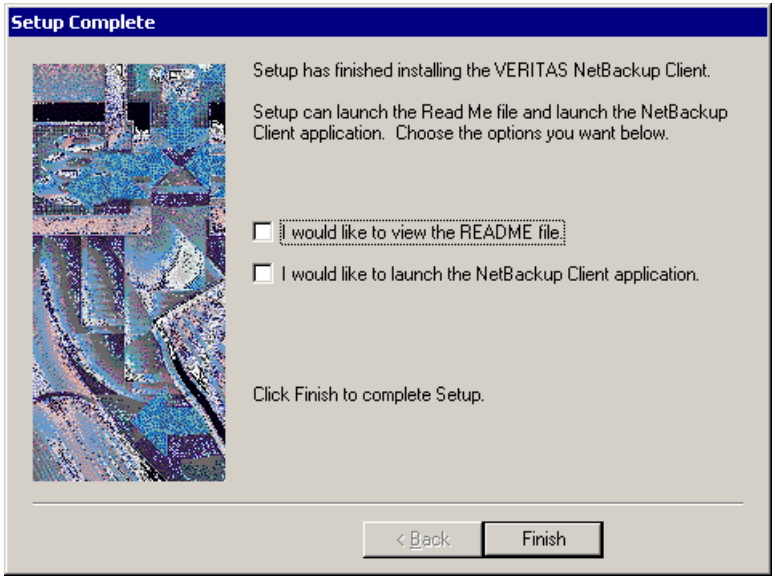

Setup Complete
Setup has finished installing the VERITAS NetBackup Client.
Setup can launch the Read Me file and launch the NetBackup Client application. Choose the options you want below.
I would like to view the README file.
I would like to launch the NetBackup Client application.
Click Finish to complete Setup.
< Back
Finish

*Figure 7-12 NetBackup — Setup Complete*

The NetBackup client is now installed. You do not have to reboot the NAS appliance.

## 7.3 Server configuration

In this section we explain how to integrate the NAS device into an existing NetBackup environment.

We assume that you have already set up the NetBackup server and that all device and server configuration tasks are completed.

As an example, we will show you how to create a new backup policy class and how to add the NAS appliance to this class. We will use simple settings, as a complete configuration and exploitation of the NetBackup functionalities is not in the scope of this paper.

Start the administrative interface for the server by selecting **Start** —> **Programs** —> **VERITAS NetBackup** —> **NetBackup Administration**. This should bring up a screen similar to Figure 7-13. If the NetBackup Wizard is started, please exit the Wizard and continue with the administration tool.

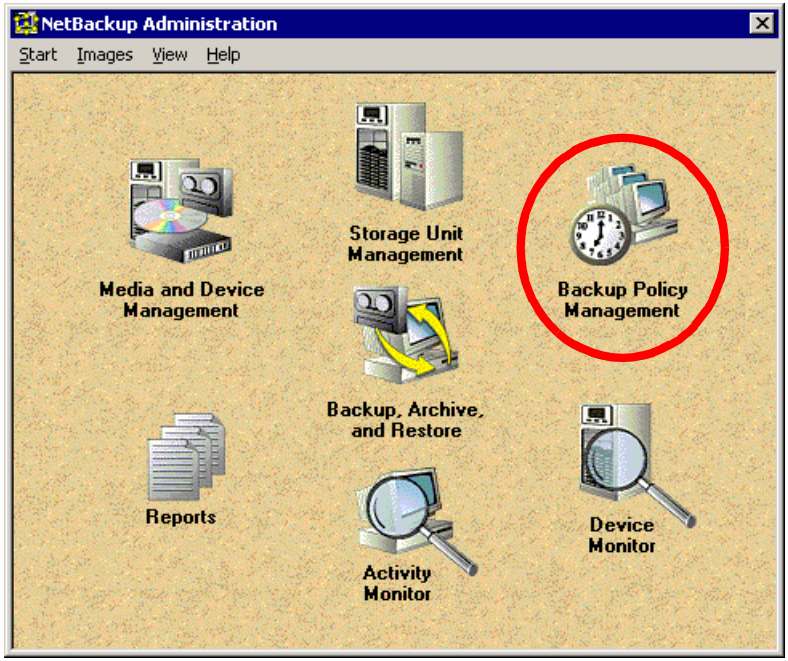



*Figure 7-13 NetBackup — Administration*

Now select Backup Policy Management (Figure 7-14).

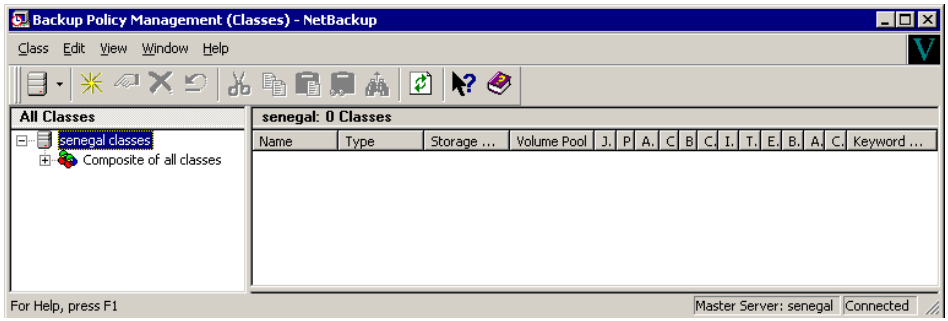



*Figure 7-14 NetBackup — Backup Policy Management*

Select **Class** from the menu bar and click **New Class ...** (Figure 7-15).

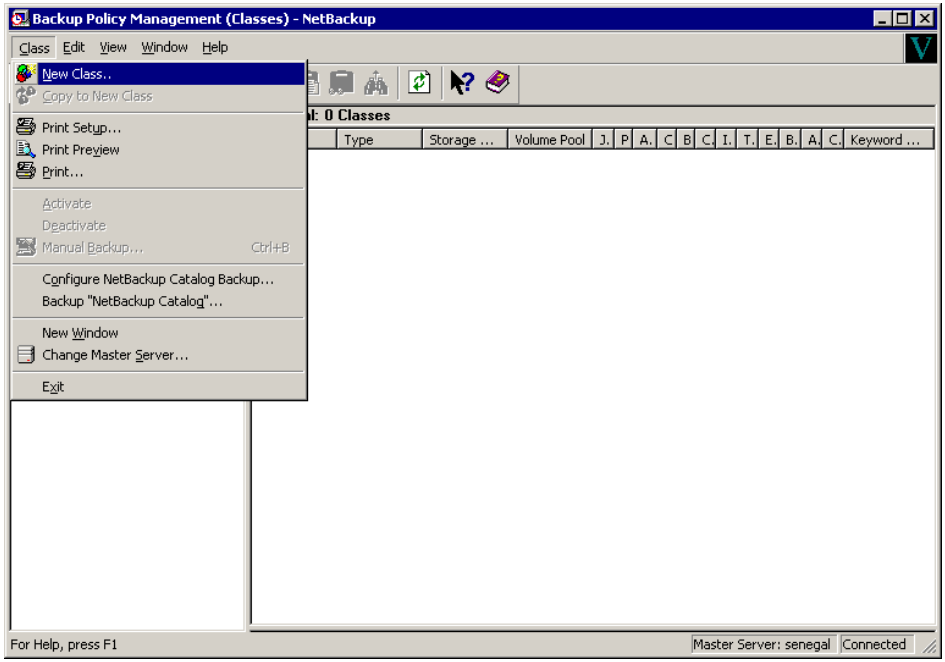



*Figure 7-15 NetBackup — New Class*

This brings up the screen shown in Figure 7-16.

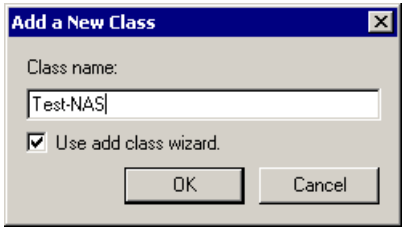



*Figure 7-16 NetBackup — Add a New Class*

Enter the name of the class and make sure, that *Use add class wizard* is selected. Click **OK**. This starts the Backup Policy Configuration Wizard (Figure 7-17).

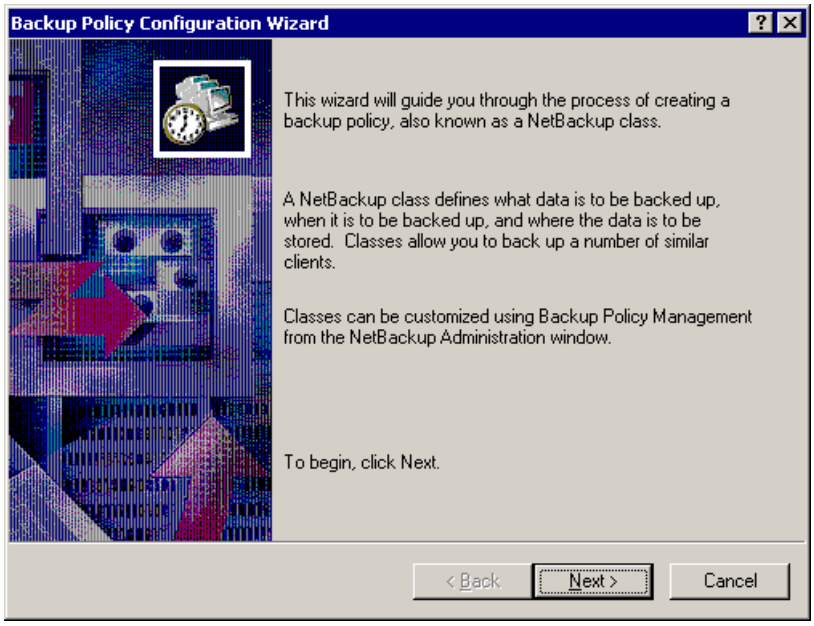

Backup Policy Configuration Wizard
This wizard will guide you through the process of creating a backup policy, also known as a NetBackup class.
A NetBackup class defines what data is to be backed up, when it is to be backed up, and where the data is to be stored. Classes allow you to back up a number of similar clients.
Classes can be customized using Backup Policy Management from the NetBackup Administration window.
To begin, click Next.
< Back
Next >
Cancel

*Figure 7-17 NetBackup — Backup Policy Configuration Wizard*

Click **Next**. In the following screen (Figure 7-18) review the class name and choose a class type. For the IBM TotalStorage NAS appliances we chose the type *MS Windows NT*. Click **Next**.

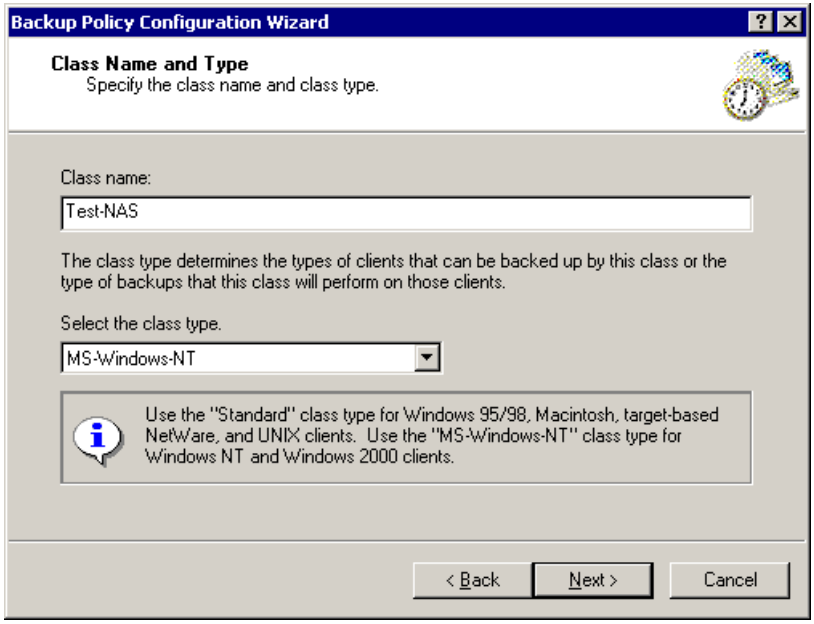

Backup Policy Configuration Wizard
Class Name and Type
Specify the class name and class type.
Class name:
Test-NAS
The class type determines the types of clients that can be backed up by this class or the type of backups that this class will perform on those clients.
Select the class type.
MS-Windows-NT
Use the "Standard" class type for Windows 95/98, Macintosh, target-based NetWare, and UNIX clients. Use the "MS-Windows-NT" class type for Windows NT and Windows 2000 clients.
< Back
Next >
Cancel

*Figure 7-18 NetBackup — Class Name and Type*

In the Client List window, click **Add** and enter the name of the client (Figure 7-19). Click **Next**.

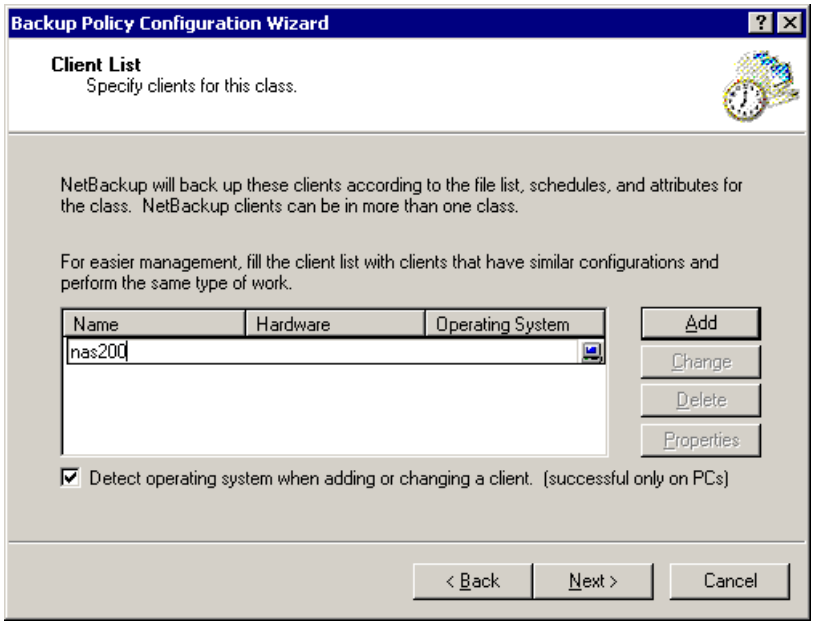

Backup Policy Configuration Wizard
Client List
Specify clients for this class.
NetBackup will back up these clients according to the file list, schedules, and attributes for the class. NetBackup clients can be in more than one class.
For easier management, fill the client list with clients that have similar configurations and perform the same type of work.
Name
Hardware
Operating System
nas200
Add
Change
Delete
Properties
Detect operating system when adding or changing a client. (successful only on PCs)
< Back
Next >
Cancel

*Figure 7-19 NetBackup — Client List*

In the screen shown in Figure 7-20, you can select the data that should be backed up for this class. Please be aware that this setting does not affect backups that are initiated from a client. Click **Next**.

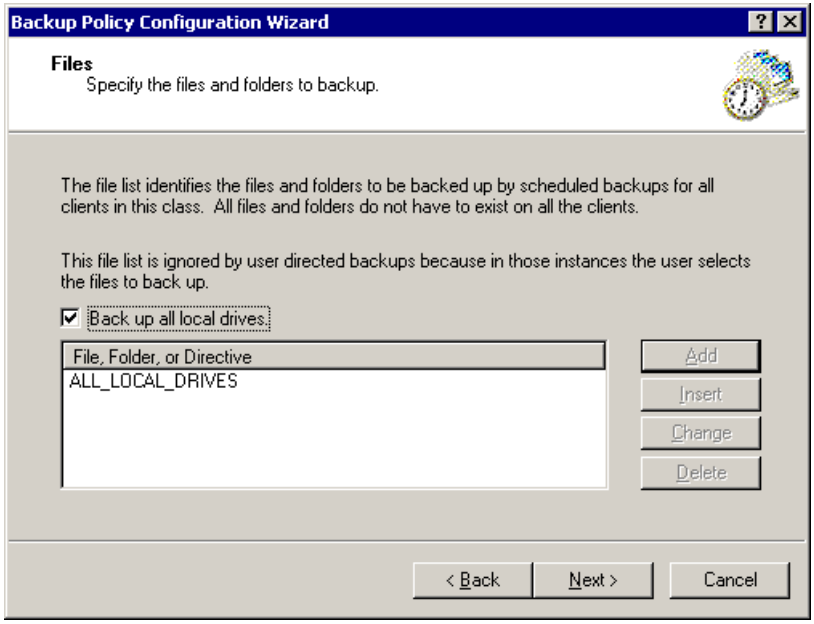

Backup Policy Configuration Wizard
Files
Specify the files and folders to backup.
The file list identifies the files and folders to be backed up by scheduled backups for all clients in this class. All files and folders do not have to exist on all the clients.
This file list is ignored by user directed backups because in those instances the user selects the files to back up.
Back up all local drives.
File, Folder, or Directive
ALL_LOCAL_DRIVES
Add
Insert
Change
Delete
< Back
Next >
Cancel

*Figure 7-20 NetBackup — Files*

Now define the backup type (Figure 7-21). For our example we used a Full Backup setting and allowed a backup to be initiated by the user. This is a prerequisite for the backup procedure described later in this chapter. Click **Next**.

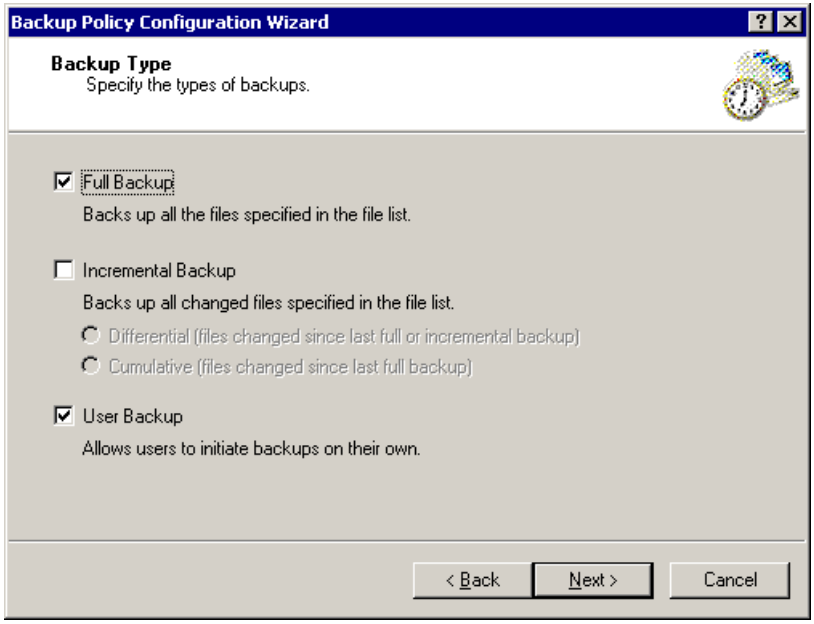

Backup Policy Configuration Wizard
Backup Type
Specify the types of backups.
Full Backup
Backs up all the files specified in the file list.
Incremental Backup
Backs up all changed files specified in the file list.
Differential (files changed since last full or incremental backup)
Cumulative (files changed since last full backup)
User Backup
Allows users to initiate backups on their own.
< Back
Next >
Cancel

*Figure 7-21 NetBackup — Backup Type*

Now define the backup rotation and retention settings according to your environment. We used the default settings (Figure 7-22). Click **Next**.

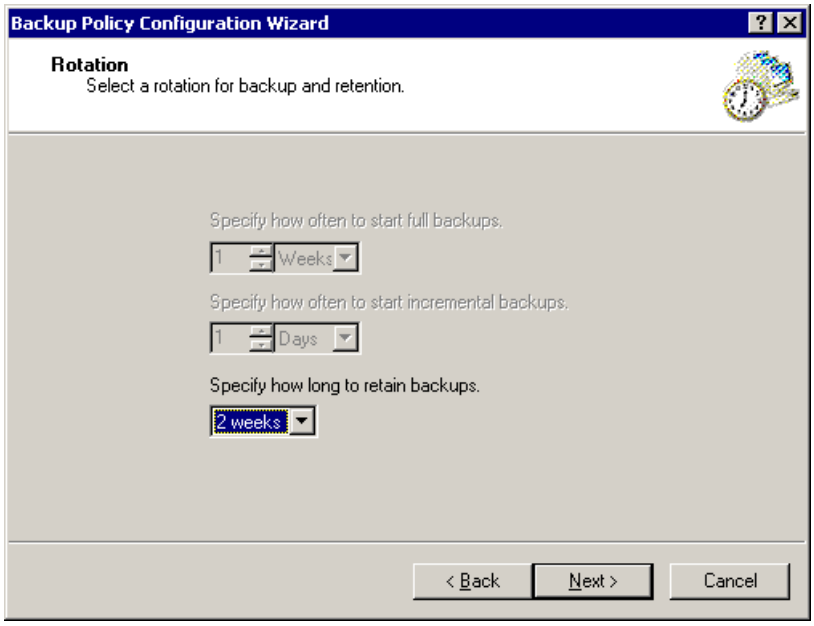



*Figure 7-22 NetBackup — Rotation*

Then define the backup start window, again according to your individual environment (Figure 7-23). Click **Next**.

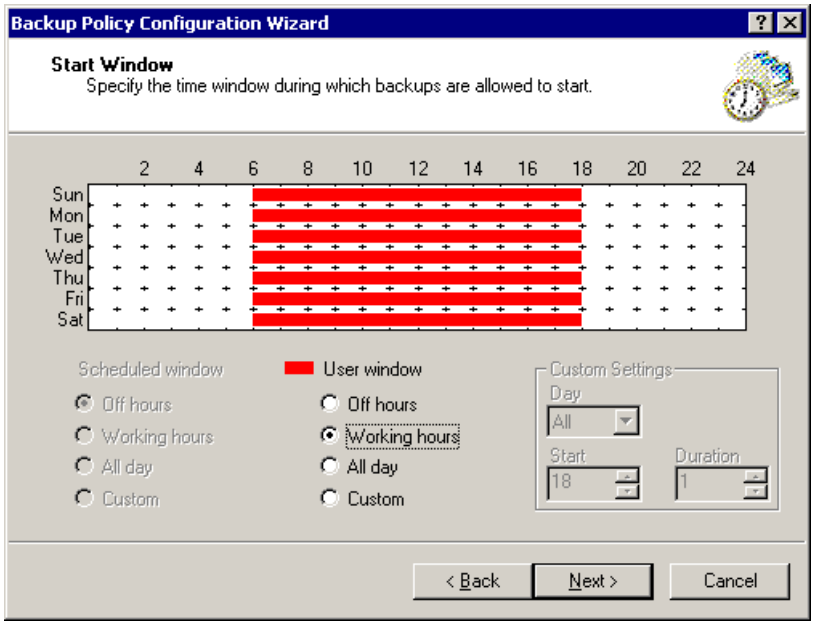



*Figure 7-23 NetBackup — Start Window*

Select Finish on the final screen (Figure 7-23) and the new class should now be visible in the main screen (Figure 7-24)

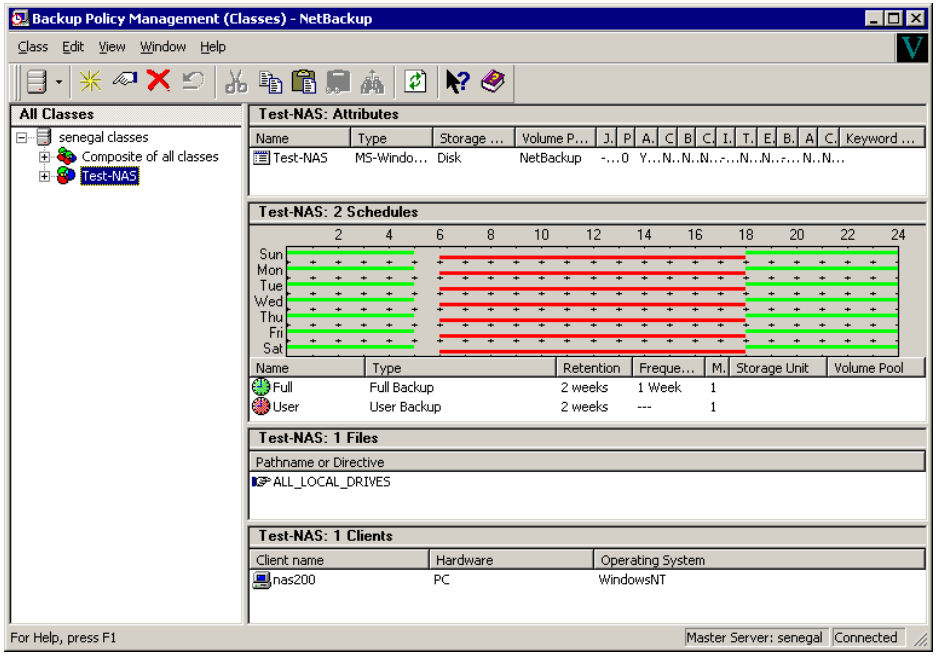

Backup Policy Management (Classes) - NetBackup
Class Edit View Window Help
All Classes
senegal classes
Composite of all classes
Test-NAS
Test-NAS: Attributes
Name Type Storage ... Volume P... J. P A. C B C I. T. E B. A C. Keyword ...
Test-NAS MS-Windo... Disk NetBackup -...0 Y...N..N..N..-...N...N...-... N..N...
Test-NAS: 2 Schedules
2 4 6 8 10 12 14 16 18 20 22 24
Sun
Mon
Tue
Wed
Thu
Fri
Sat
Name Type Retention Freque... M. Storage Unit Volume Pool
Full Full Backup 2 weeks 1 Week 1
User User Backup 2 weeks --- 1
Test-NAS: 1 Files
Pathname or Directive
ALL_LOCAL_DRIVES
Test-NAS: 1 Clients
Client name Hardware Operating System
nas200 PC WindowsNT
For Help, press F1
Master Server: senegal
Connected

*Figure 7-24 NetBackup — NAS class*

Now you are ready to initiate a backup.

## 7.4 Starting a backup

When all server and client configuration tasks are completed, we can start with initiating the first backup process. We chose to initiate a backup from the NAS appliance, so connect to the appliance (either locally or through a Terminal Services Client).

Then click **Start** —> **Programs** —> **VERITAS NetBackup** —> **NetBackup**. This will bring up the Backup, Archive, and Restore screen. Click **Select for Backup** and select the data to be backed up, as shown in Figure 7-25.

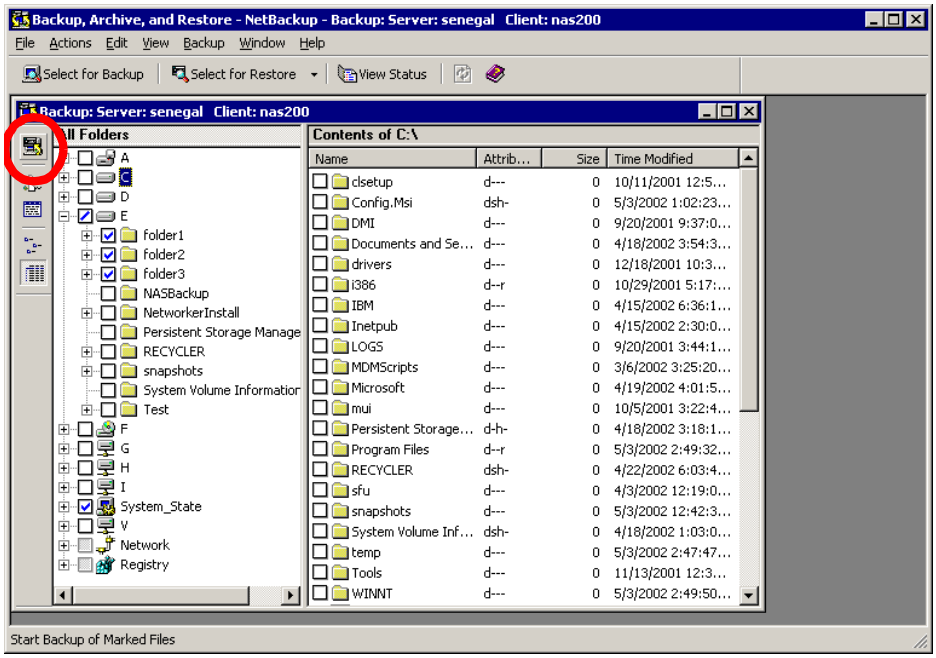



*Figure 7-25 NetBackup — Backup selection*

Then click the **Start Backup** icon in the top left corner. In the Backup Options screen (Figure 7-26) you can set additional options. We left everything at default. Click **Start Backup**.

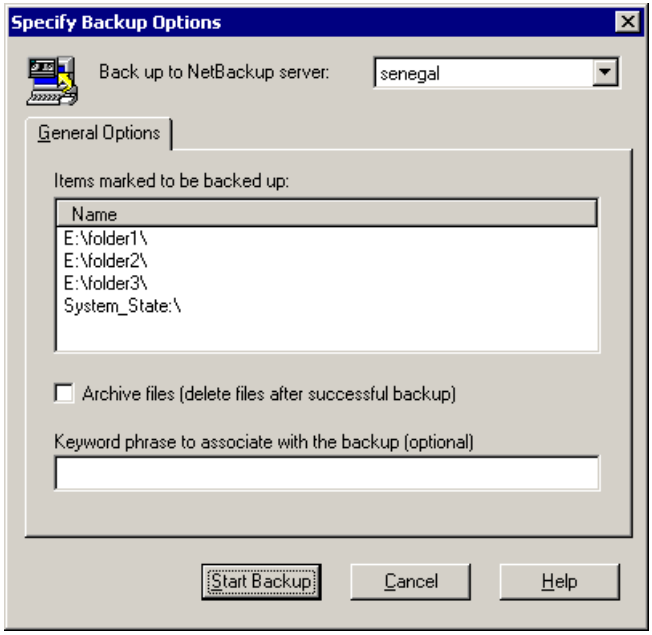



*Figure 7-26 NetBackup — Backup Options*

In the next screen (Figure 7-27) you can define wether you want to view the progress of the backup. We chose **Yes**.

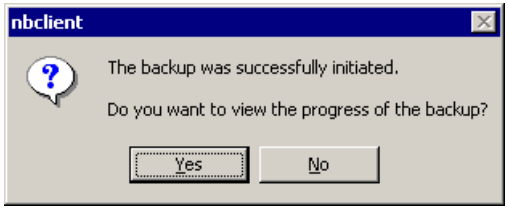



*Figure 7-27 NetBackup — Backup initiated*

You can now see the progress of the backup. When the backup is finished, you will be presented with a screen similar to Figure 7-28. Remember to press **Refresh** or set a refresh rate to get updated information. The progress can also be checked from the backup server.

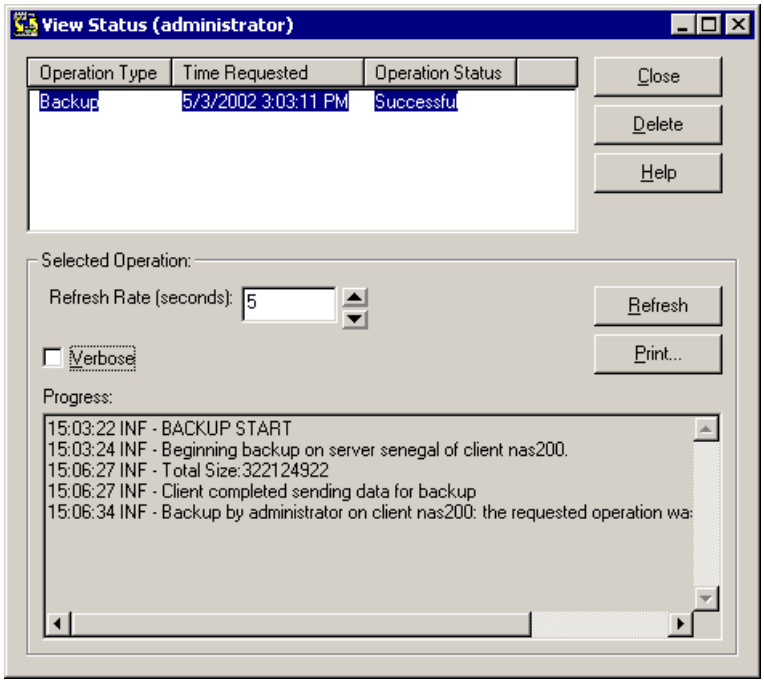



*Figure 7-28 NetBackup — Backup finished*

Congratulations! The first backup of your IBM TotalStorage NAS device is successfully completed.

8

# Legato NetWorker

In this chapter we show how to integrate the IBM TotalStorage NAS appliances into an existing Legato NetWorker environment.

© Copyright IBM Corp. 2002

# 8.1 Introduction to Legato NetWorker

Legato NetWorker protects the critical business data of more than 10,000 enterprise customers worldwide by simplifying, centralizing, and automating backup and recovery operations across Unix, Windows, Linux and NetWare platforms in DAS, NAS, and SAN storage environments. Built upon an open, highly scalable client-server architecture, NetWorker reduces management overhead by providing “lights-out” protection of storage assets in the largest corporate data centers and the smallest satellite branch offices.

For our tests we used NetWorker 6.1.1.

**Note:** For updates on third party product certification, see the NAS Interoperability List at this site:

http://www.storage.ibm.com/snetwork/nas/nas_interoperability.html

For more details on Legato and their products, see their Web site at:

http://www.legato.com

## 8.2 Agent installation and configuration

For this chapter, we assume that you have already installed and configured at least one Legato Networker backup server in your network. We used a Legato NetWorker 6.1.1 server, other versions may require additional steps.

Connect to the IBM TotalStorage NAS device via a Terminal Services client. After inserting the Legato NetWorker CD, you will be presented with a default screen similar to Figure 8-1.

NT Splash - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address G:\temp\winnt\autorun\autorun.htm
Go Links
Thank You
for selecting Legato® NetWorker® for your Windows enterprise backup and recovery solution. NetWorker for Windows NT® and NetWorker for Windows® 2000 deliver fast, reliable data protection across your entire organization -- regardless of how many servers you have or which platform they're running on. This revolutionary new approach, called Enterprise Storage Management, offers an ideal solution for companies looking to re-centralize the backup process.
The Enterprise Storage Management Solution
LEGATO™
THE NET BENEATH THE NETWORKS™
NetWorker®
Legato NetWorker for Windows NT and NetWorker for Windows 2000 combine enterprise-strength storage management and comprehensive integration with Microsoft® BackOffice®, Microsoft Windows NT 4.0, and Microsoft Windows 2000. NetWorker is the first in a new breed of Enterprise Storage Management solutions that can help you improve the way you protect critical information assets, take maximum advantage of existing resources, and dramatically reduce administrative costs.
Get Started
Install Legato NetWorker for Windows 2000
Install Legato NetWorker for Windows NT 4.0
Visit our Web Site
Legato Systems, Inc.
Done
Local intranet

*Figure 8-1 NetWorker — autorun screen*

Select **Install Legato NetWorker for Windows 2000**. This should bring up a screen similar to Figure 8-2.

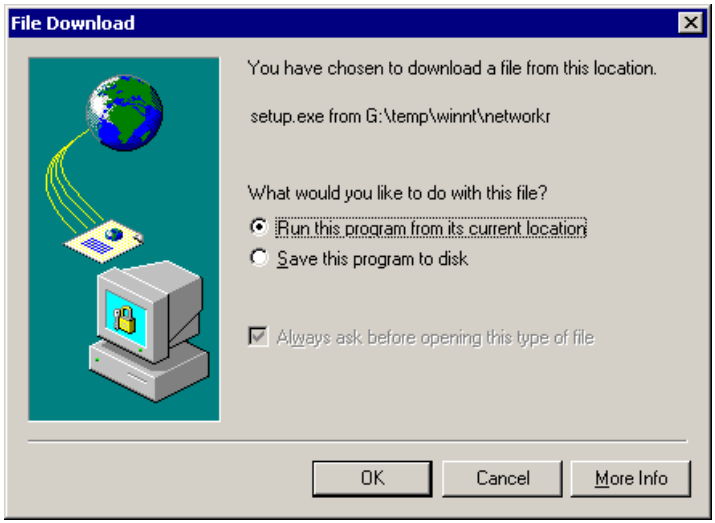

File Download
You have chosen to download a file from this location.
setup.exe from G:\temp\winnt\networkr
What would you like to do with this file?
Run this program from its current location
Save this program to disk
Always ask before opening this type of file
OK
Cancel
More Info

*Figure 8-2 NetWorker — File Download screen*

Select **Run this program** and click **OK**. If a security warning pops up, acknowledge it by clicking **Yes**.

Now the NetWorker setup program should launch with a screen similar to Figure 8-3.

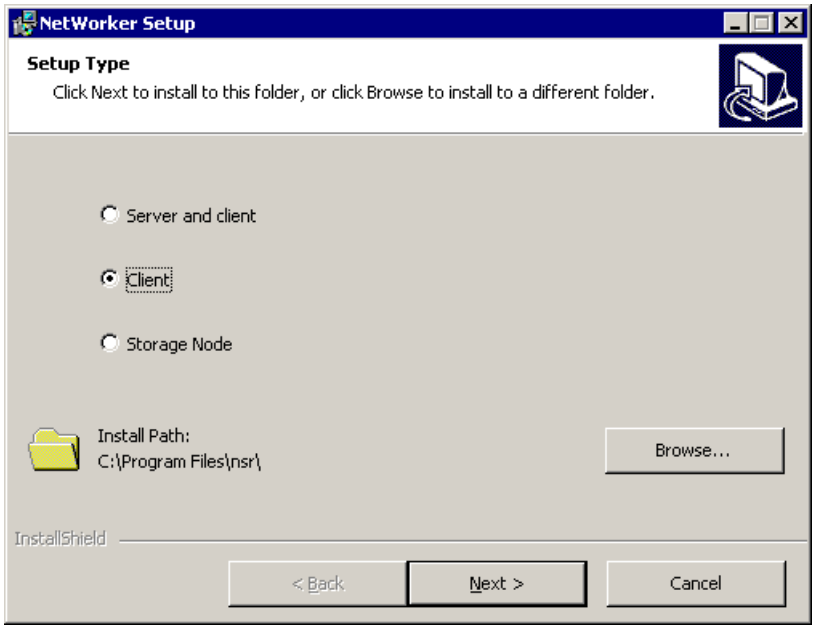



*Figure 8-3 NetWorker — Setup Type*

Select **Client** and click **Next**. This brings up the Allowed Servers screen (see Figure 8-4).

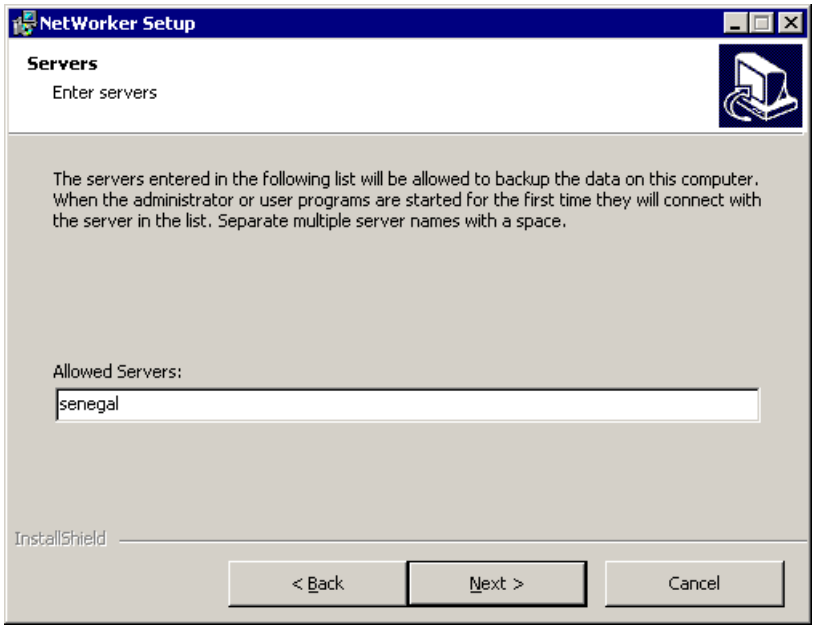

NetWorker Setup
Servers
Enter servers
The servers entered in the following list will be allowed to backup the data on this computer. When the administrator or user programs are started for the first time they will connect with the server in the list. Separate multiple server names with a space.
Allowed Servers:
senegal
InstallShield
< Back
Next >
Cancel

*Figure 8-4 NetWorker — Allowed Servers*

Type in the servers that are allowed to access the client. Click **Next**. This brings up the Ready to Install screen, as shown in Figure 8-5.

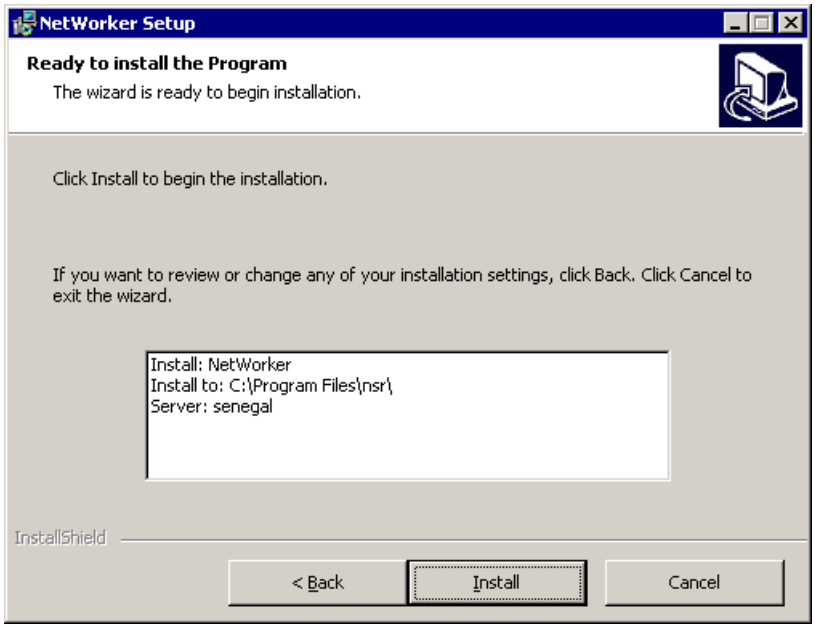

NetWorker Setup
Ready to install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
Install: NetWorker
Install to: C:\Program Files\nsr\
Server: senegal
InstallShield
< Back
Install
Cancel

*Figure 8-5 NetWorker — Ready to Install the Program*

Review the settings and click **Install**. You will be prompted with a status screen (Figure 8-6), click **Finish** to complete the installation.

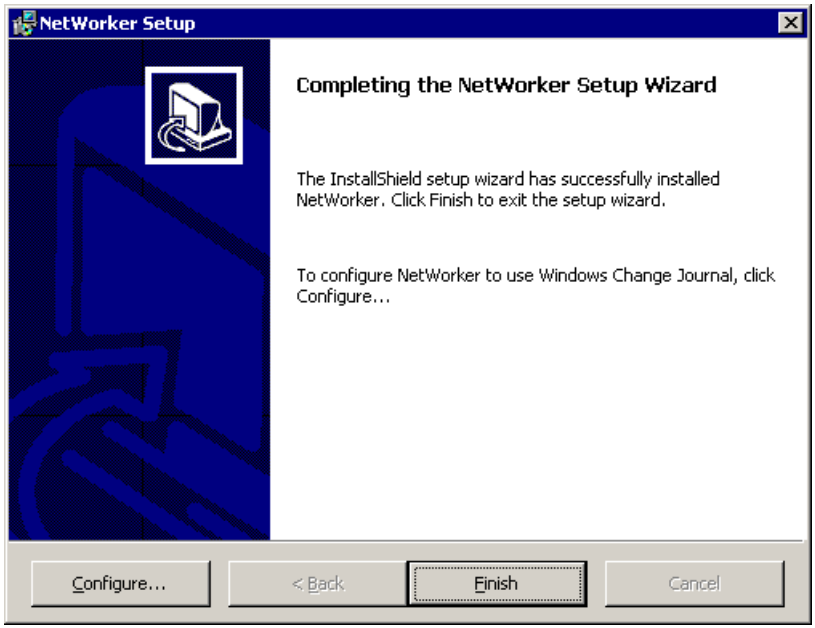

NetWorker Setup
Completing the NetWorker Setup Wizard
The InstallShield setup wizard has successfully installed NetWorker. Click Finish to exit the setup wizard.
To configure NetWorker to use Windows Change Journal, click Configure...
Configure...
< Back
Finish
Cancel

*Figure 8-6 NetWorker — Completing the NetWorker Setup Wizard*

## 8.3 Server configuration

We assume that you have already set up and configured the Legato NetWorker backup server. In this chapter we will explain how to integrate the IBM TotalStorage NAS devices into the Legato NetWorker client management.

On the backup server, select **Start** —> **Programs** —> **NetWorker Group** —> **NetWorker Administrator**.

You will see the NetWorker Administrator screen (see Figure 8-7).

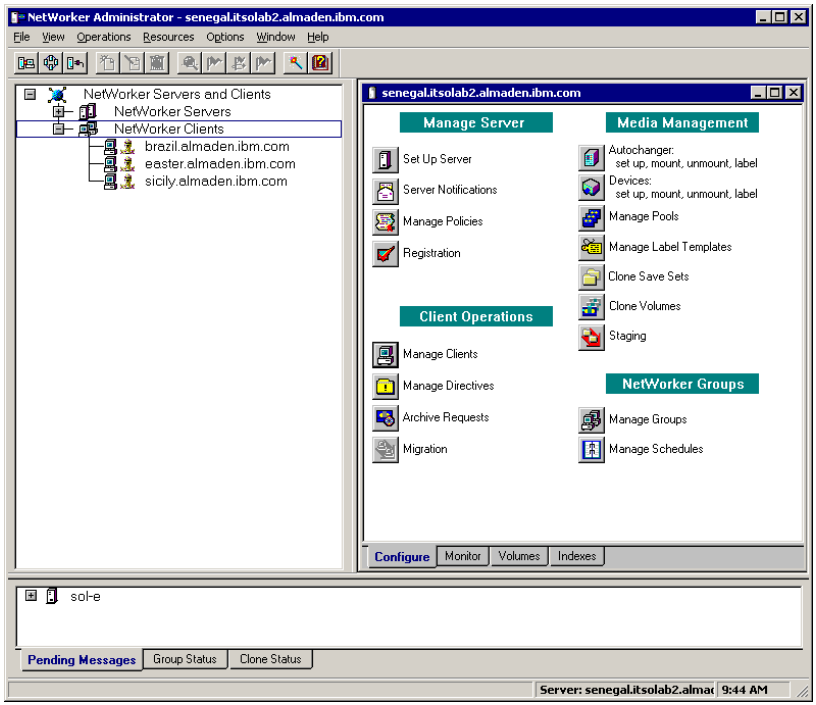



*Figure 8-7 NetWorker — Administrator*

In the right pane, click **Manage Clients**. You will now see the clients that are already configured for this server (Figure 8-8).

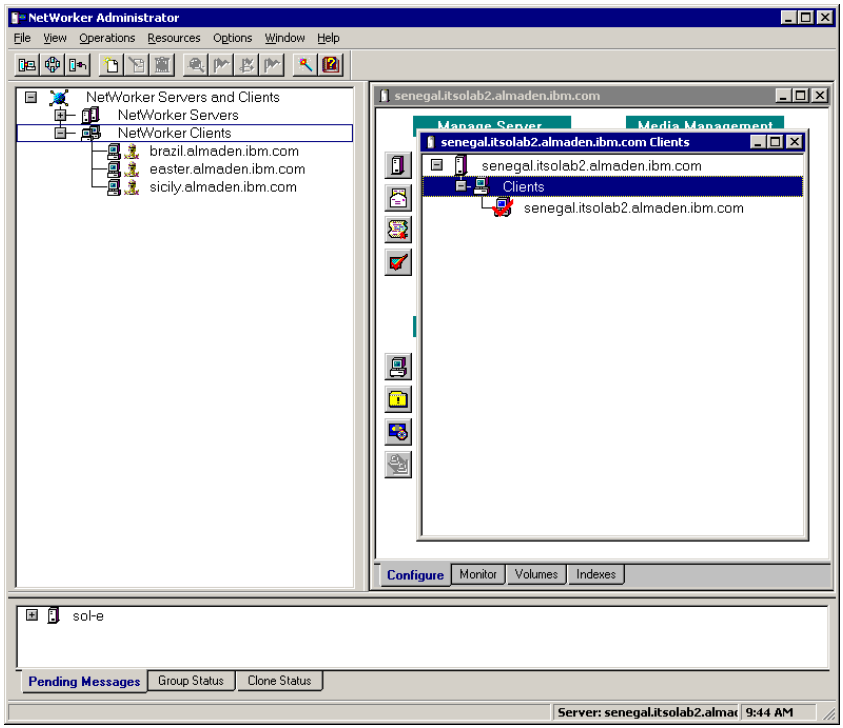



*Figure 8-8 NetWorker — Manage Clients*

Right-click **Clients** and select **Create...** (Figure 8-9).

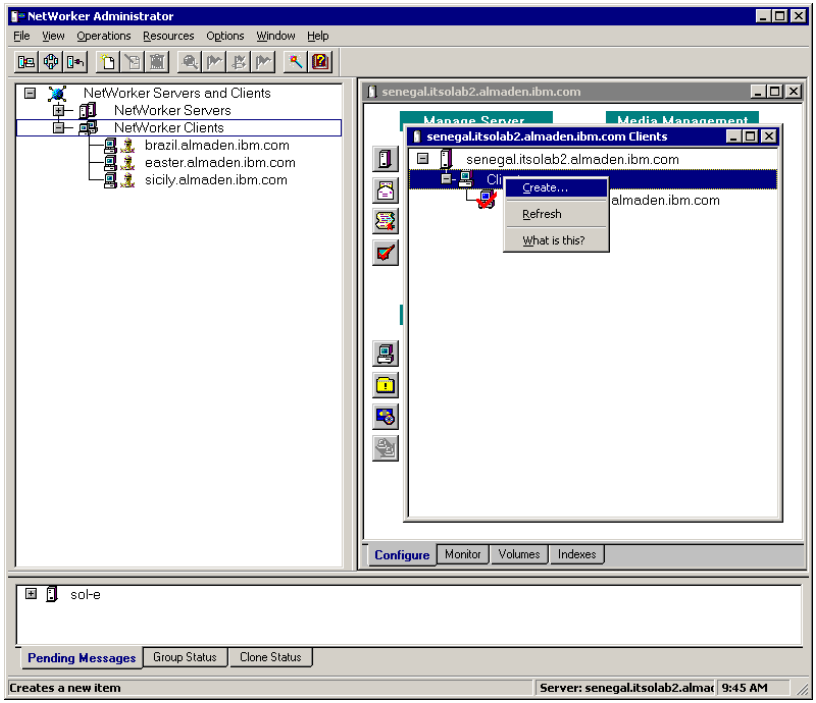



*Figure 8-9 NetWorker — Create Client*

Now enter the Legato client name for the client to be created (Figure 8-10).

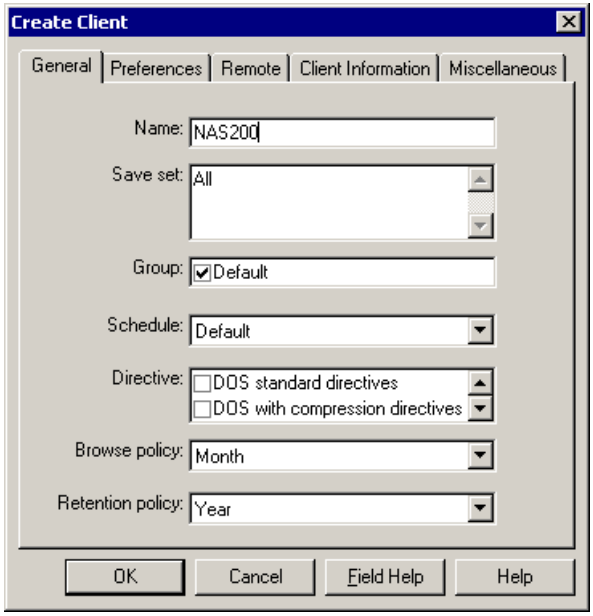



*Figure 8-10 NetWorker — Create Client window*

Click **OK**. Now you should see the newly created client in the Clients view (Figure 8-11).

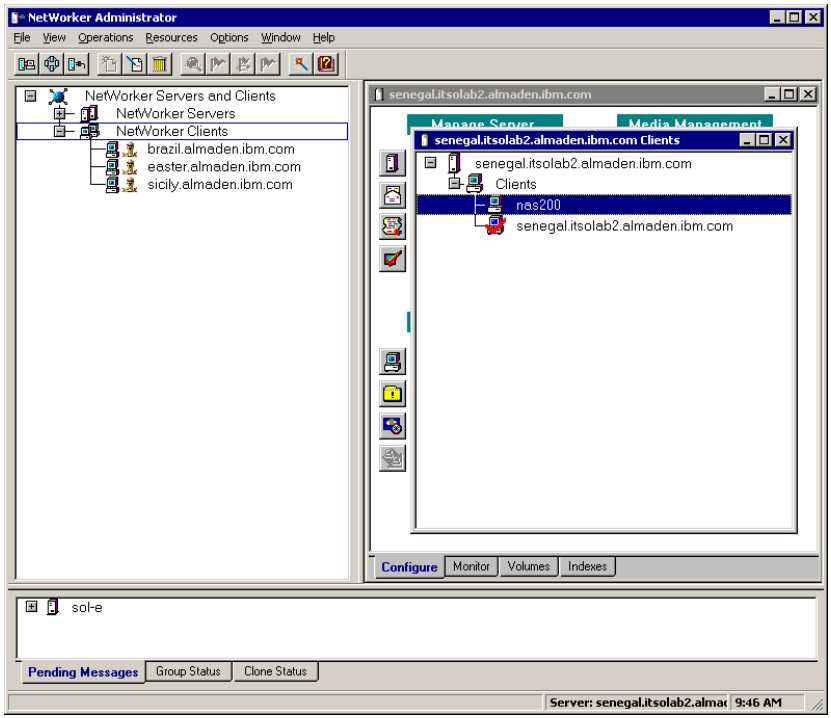



*Figure 8-11 NetWorker — New Client*

## 8.4 Starting a backup

We assume that the backup server is set up, the client software is installed and the client is accessible from the Legato NetWorker server. Also we assume, that a proper device, pools and groups configuration has been applied to the server and that the client has been assigned to an appropriate client group.

Connect to the NAS device using Terminal Services client. Select **Start** —> **Programs** —> **NetWorker Group** —> **NetWorker User**. This will bring up the NetWorker User default screen (Figure 8-12).

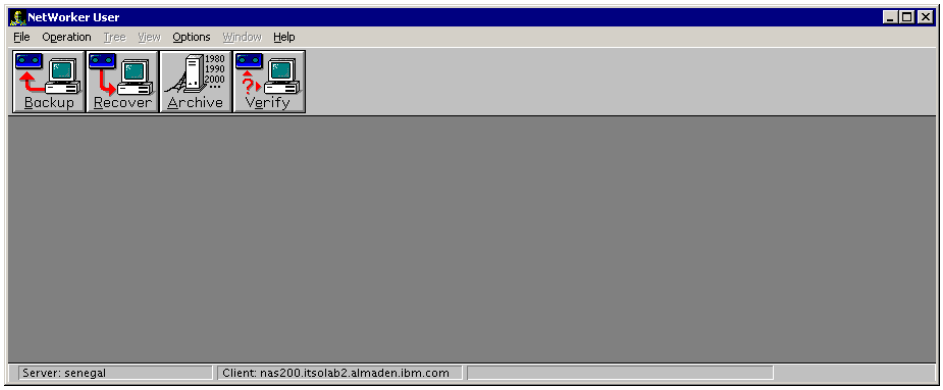



*Figure 8-12 NetWorker — User*

The NetWorker User program should now start to connect to the NetWorker server. As soon as this is accomplished, you can start the backup process by clicking **Backup**.

In the following screen select the data to back up and click **Mark** (see Figure 8-13).

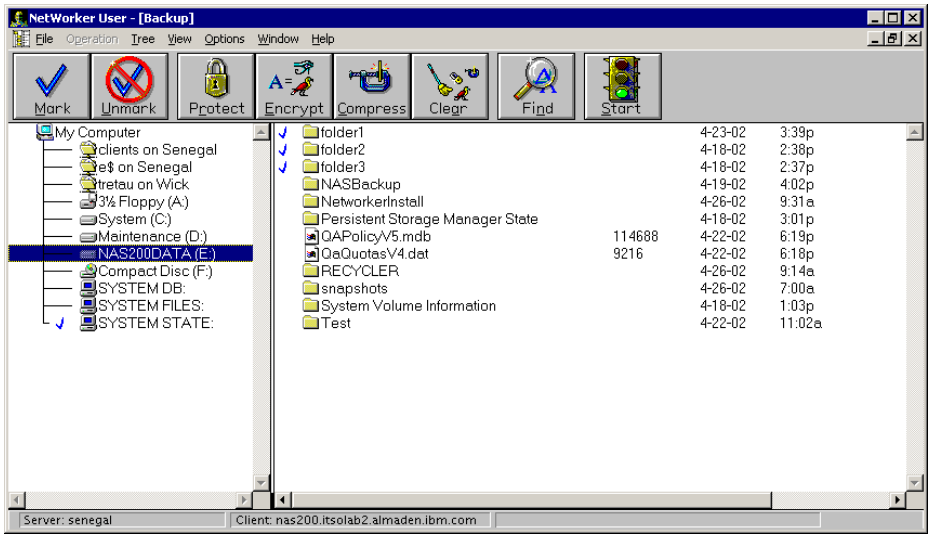



*Figure 8-13 NetWorker — Backup*

Review your settings and click **Start**.

The Backup Status window will show the status of the backup process, as shown in Figure 8-14.

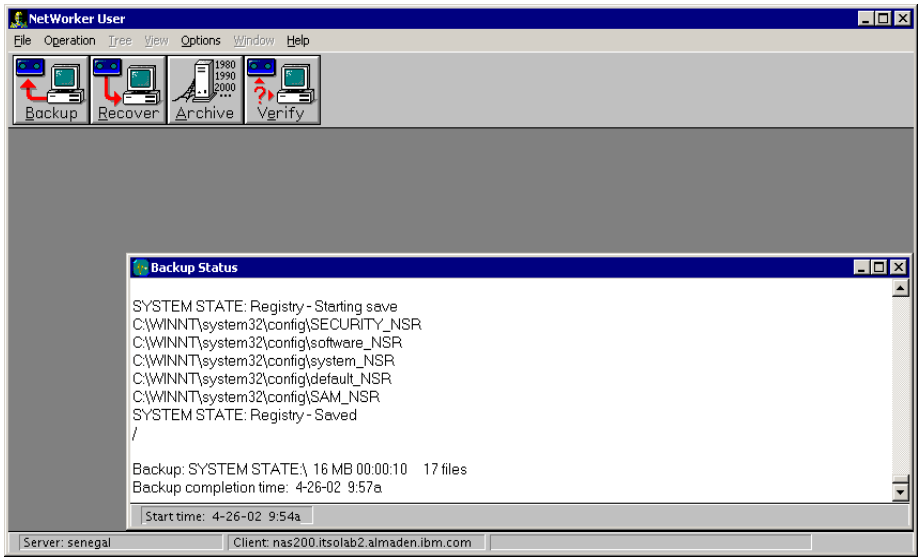



*Figure 8-14 NetWorker — Backup Status*

To restore the data you have backed up, click **Recover**, select the data to be recovered, click **Mark** and then **Start**. After resolving possible naming conflicts the restore should be processed.

Congratulations! You have successfully backed up the data on your IBM TotalStorage NAS device using Legato NetWorker.

9

# Backup and restore considerations for iSCSI

In this chapter we discuss how to perform backup and restore operations in an iSCSI environment.

© Copyright IBM Corp. 2002

# 9.1 Introduction to iSCSI

iSCSI is a proposed industry-standard that allows SCSI block I/O protocols (commands, sequences and attributes) to be sent over a network using the popular TCP/IP protocol. This is analogous to the way SCSI commands are already mapped to Fibre Channel, parallel SCSI, and SSA media.

In February 2001 IBM announced the IBM TotalStorage IP Storage 200i, which became generally available in June 2001. This is a network appliance that uses the iSCSI technology. The IP Storage 200i appliance solution includes client initiators. These comprise client software device drivers for Windows NT, Windows 2000, and Linux clients. These device drivers coexist with existing SCSI devices without disruption. They initiate the iSCSI I/O request over the IP network to the target IP Storage 200i.

iSCSI uses the SCSI I/O protocol. Therefore, it is block I/O oriented, like a direct attached storage device (DAS) or a storage area network device (SAN); rather than file I/O oriented, like a NAS appliance. This is illustrated in Figure 9-1. Support for general purpose storage applications over TCP/IP, including database systems, is provided.

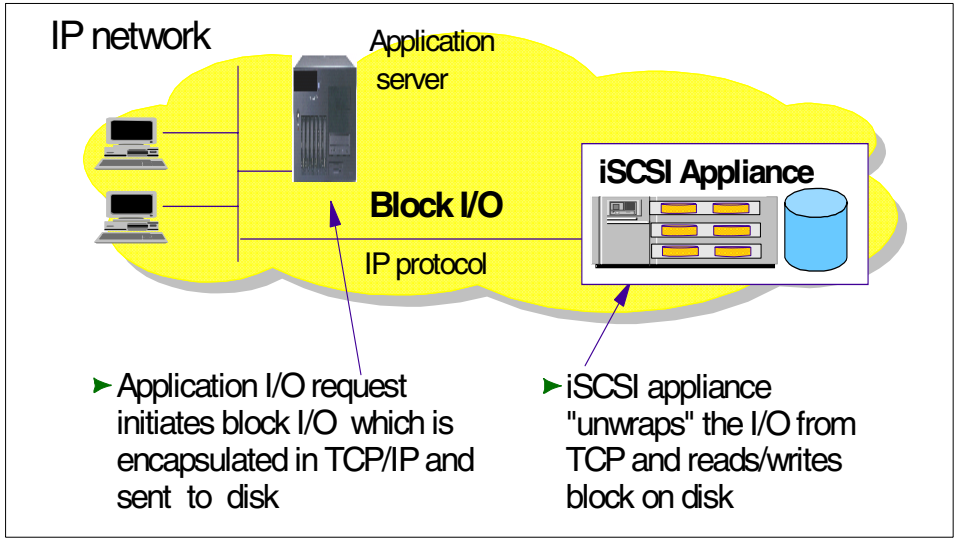

IP network
Application server
iSCSI Appliance
Block I/O
IP protocol
Application I/O request initiates block I/O which is encapsulated in TCP/IP and sent to disk
iSCSI appliance "unwraps" the I/O from TCP and reads/writes block on disk

*Figure 9-1 iSCSI uses block I/O*

For more information on iSCSI, IBM's iSCSI products, and how to integrate them into your environment, please see the following IBM Redbooks:

- *IP Storage Networking: IBM NAS and iSCSI solutions*, SG24-6240
- *Using iSCSI - Solutions' Planning and Implementation*, SG24-6291

## 9.2 Backup and recovery of user data

Basically, backup and recovery in an iSCSI environment is the same as in a classical direct attached storage (DAS) environment. Let's have a closer look at this.

In a DAS environment, storage devices are attached by cable directly to the server. In PC configurations, the storage is usually integrated in the same cabinet as the processor. In mainframe and large open servers, the storage is typically located in a separate unit some distance from the host. The connection is typically made by a SCSI or IDE cable. Each server effectively "owns" its own storage devices. I/O requests access devices directly, as illustrated in Figure 9-2. This topology was designed initially for efficiency and high performance. Sharing data between systems was not initially anticipated.

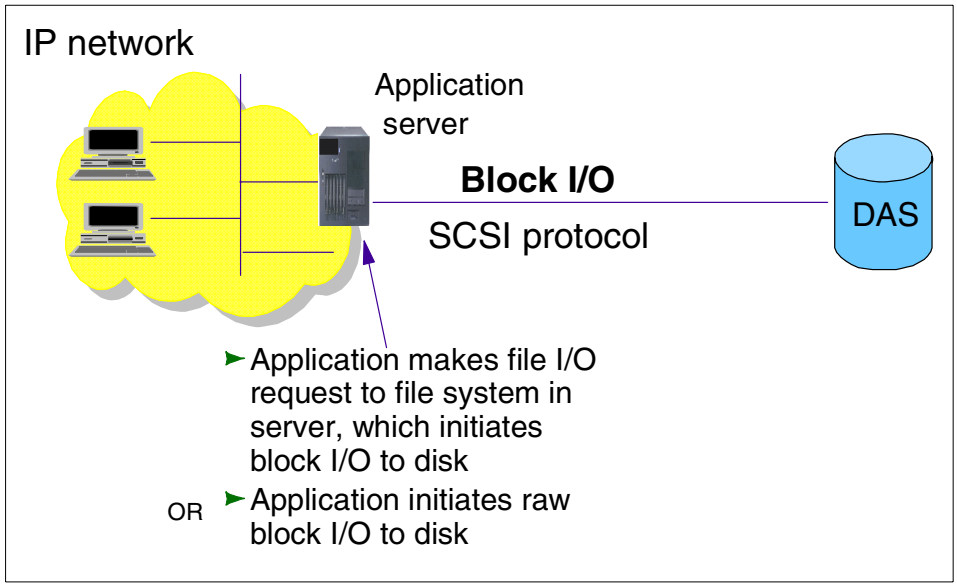

IP network
Application server
Block I/O
SCSI protocol
DAS
Application makes file I/O request to file system in server, which initiates block I/O to disk
OR
Application initiates raw block I/O to disk

*Figure 9-2 DAS uses block I/O*

So what about iSCSI? In a DAS environment, the operating system (OS) uses a device driver to access the storage devices. In case of a SCSI disk, this would be a SCSI device driver. So — simply speaking — from an OS point of view the storage device is a direct attached SCSI disk when it uses a SCSI disk driver to access the storage device. The OS is not aware if it is a FC SAN (that also uses the SCSI protocol over FC) or an iSCSI device (that encapsulates SCSI commands into IP packets) or really a local SCSI disk.

In summary, the OS (as well as the applications running on it — including backup applications) sees a SCSI disk drive, even if it is an iSCSI device attached using an IP network.

So, if you have an application server that uses the iSCSI driver, the OS (and the application) will be presented with a local SCSI disk drive, for example drive E:. If you want to back up the data on drive E: — just install a backup agent on this application server and perform a backup from this drive. The backup application will not recognize any difference to a local SCSI disk.

Therefore, the backup of an application server that uses an iSCSI storage device is just the same as the old-style backup that you are used to perform.

## 9.3 Recovery of the IBM TotalStorage IP Storage 200i

The previous chapter described the backup of user data that has been stored on an iSCSI appliance. Let us now look at the means IBM provides for easy backup and recovery of the system settings on the IBM TotalStorage IP Storage 200i — IBM's iSCSI appliance.

To make the recovery of your individual system settings possible, they need to be backed up first. To accomplish this, follow these simple steps:

1. Start the Web browser based management interface
2. Select **System** —> **Configuration** —> **Backup** from the left window pane
3. Enter the address and filename for an FTP server you want to use to store the iSCSI configuration (see Figure 9-3) and click **Apply**.

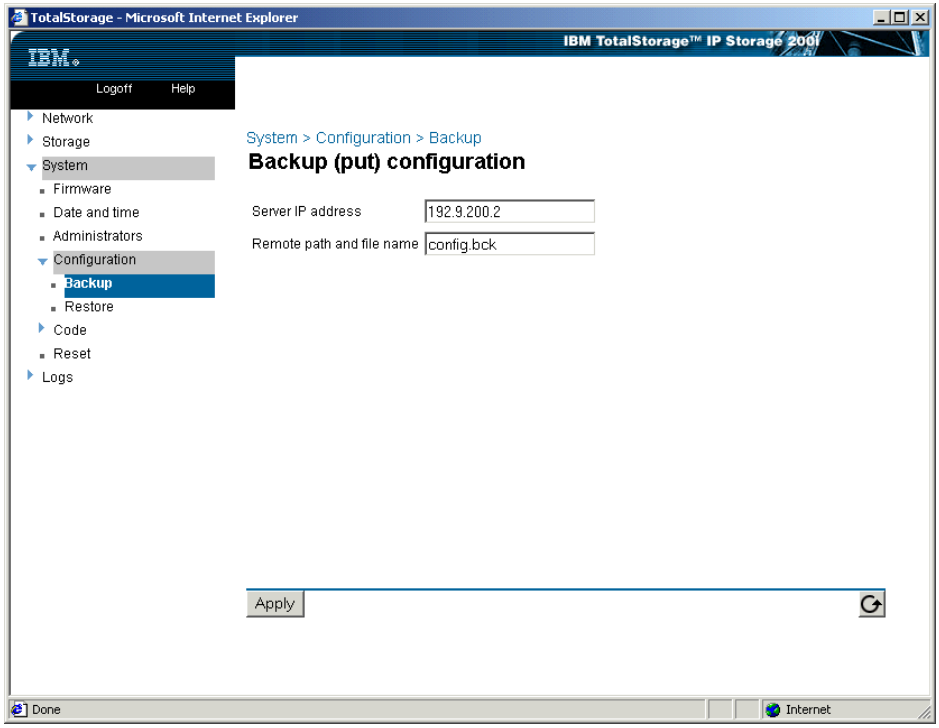



*Figure 9-3 iSCSI — Backup configuration*

If you need to recover the system follow the description in the user manual that ships with the system to recover the operating system image.

When the system is re-loaded you need to re-apply your system settings. To restore the system settings, follow these steps:

1. Start the Web browser based management interface
2. Select **System** —> **Configuration** —> **Restore** from the left window pane
3. Enter the address and filename for an FTP server you want to use to restore the iSCSI configuration (see Figure 9-3) and click **Apply**.

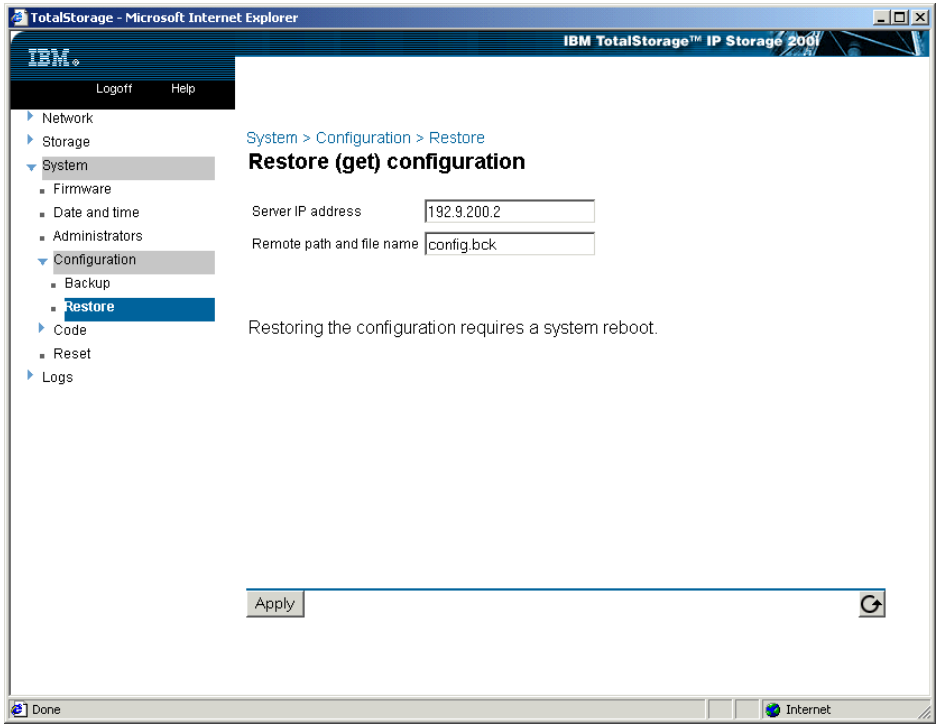



*Figure 9-4 iSCSI — Restore configuration*

Remember to reboot the iSCSI appliance.

Now your IP Storage 200i is restored, including the system settings. Next, re-attach the iSCSI client systems and restore the user data using your favorite backup software.

# Abbreviations and acronyms

| | |
|---|---|
| **ABI** | Application Binary Interface |
| **ACE** | Access Control Entries |
| **ACL** | Access Control List |
| **AD** | Microsoft Active Directory |
| **ADSM** | ADSTAR Distributed Storage Manager |
| **AFS** | Andrew File System |
| **AIX** | Advanced Interactive eXecutive |
| **ANSI** | American National Standards Institute |
| **APA** | All Points Addressable |
| **API** | Application Programming Interface |
| **APPC** | Advanced Program-to-Program |
| **APPN** | Advanced Peer-to-Peer Networking |
| **ARC** | Advanced RISC Computer |
| **ARPA** | Advanced Research Projects Agency |
| **ASCII** | American National Standard Code for Information Interchange |
| **ATE** | Asynchronous Terminal Emulation |
| **ATM** | Asynchronous Transfer Mode |
| **AVI** | Audio Video Interleaved |
| **BDC** | Backup Domain Controller |
| **BIND** | Berkeley Internet Name Domain |
| **BNU** | Basic Network Utilities |
| **BOS** | Base Operating System |
| **BRI** | Basic Rate Interface |
| **BSD** | Berkeley Software Distribution |
| **BSOD** | Blue Screen of Death |
| **BUMP** | Bring-Up Microprocessor |
| **CA** | Certification Authorities |
| **CAL** | Client Access License |
| **C-SPOC** | Cluster single point of control |
| **CDE** | Common Desktop Environment |
| **CDMF** | Commercial Data Masking Facility |
| **CDS** | Cell Directory Service |
| **CERT** | Computer Emergency Response Team |
| **CGI** | Common Gateway Interface |
| **CHAP** | Challenge Handshake Authentication |
| **CIDR** | Classless InterDomain Routing |
| **CIFS** | Common Internet File System |
| **CMA** | Concert Multi-threaded Architecture |
| **CO** | Central Office |
| **COPS** | Computer Oracle and Password System |

© Copyright IBM Corp. 2002

| | |
|---|---|
| **CPI-C** | Common Programming Interface for Communications |
| **CPU** | Central Processing Unit |
| **CSNW** | Client Service for NetWare |
| **CSR** | Client/server Runtime |
| **DAC** | Discretionary Access Controls |
| **DARPA** | Defense Advanced Research Projects Agency |
| **DASD** | Direct Access Storage Device |
| **DBM** | Database Management |
| **DCE** | Distributed Computing Environment |
| **DCOM** | Distributed Component Object Model |
| **DDE** | Dynamic Data Exchange |
| **DDNS** | Dynamic Domain Name System |
| **DEN** | Directory Enabled Network |
| **DES** | Data Encryption Standard |
| **DFS** | Distributed File System |
| **DHCP** | Dynamic Host Configuration Protocol |
| **DLC** | Data Link Control |
| **DLL** | Dynamic Load Library |
| **DS** | Differentiated Service |
| **DSA** | Directory Service Agent |
| **DSE** | Directory Specific Entry |
| **DNS** | Domain Name System |
| **DTS** | Distributed Time Service |
| **EFS** | Encrypting File Systems |
| **EGID** | Effective Group Identifier |
| **EISA** | Extended Industry Standard Architecture |
| **EMS** | Event Management Services |
| **EPROM** | Erasable Programmable Read-Only |
| **ERD** | Emergency Repair Disk |
| **ERP** | Enterprise Resources Planning |
| **ERRM** | Event Response Resource Manager |
| **ESCON** | Enterprise System Connection |
| **ESP** | Encapsulating Security Payload |
| **ESS** | Enterprise Storage Server |
| **EUID** | Effective User Identifier |
| **FAT** | File Allocation Table |
| **FC** | Fibre Channel |
| **FDDI** | Fiber Distributed Data Interface |
| **FDPR** | Feedback Directed Program Restructure |
| **FIFO** | First In/First Out |
| **FIRST** | Forum of Incident Response and Security |
| **FQDN** | Fully Qualified Domain Name |
| **FSF** | File Storage Facility |
| **FTP** | File Transfer Protocol |
| **FtDisk** | Fault-Tolerant Disk |
| **GC** | Global Catalog |
| **GDA** | Global Directory Agent |
| **GDI** | Graphical Device Interface |
| **GDS** | Global Directory Service |
| **GID** | Group Identifier |

| | |
|---|---|
| **GL** | Graphics Library |
| **GSNW** | Gateway Service for NetWare |
| **GUI** | Graphical User Interface |
| **HA** | High Availability |
| **HACMP** | High Availability Cluster Multiprocessing |
| **HAL** | Hardware Abstraction Layer |
| **HBA** | Host Bus Adapter |
| **HCL** | Hardware Compatibility List |
| **HSM** | Hierarchical Storage Management |
| **HTTP** | Hypertext Transfer Protocol |
| **IBM** | International Business Machines Corporation |
| **ICCM** | Inter-Client Conventions Manual |
| **IDE** | Integrated Drive Electronics |
| **IDL** | Interface Definition Language |
| **IDS** | Intelligent Disk Subsystem |
| **IEEE** | Institute of Electrical and Electronic Engineers |
| **IETF** | Internet Engineering Task Force |
| **IGMP** | Internet Group Management Protocol |
| **IIS** | Internet Information Server |
| **IKE** | Internet Key Exchange |
| **IMAP** | Internet Message Access Protocol |
| **I/O** | Input/Output |
| **IP** | Internet Protocol |
| **IPC** | Interprocess Communication |
| **IPL** | Initial Program Load |
| **IPsec** | Internet Protocol Security |
| **IPX** | Internetwork Packet eXchange |
| **ISA** | Industry Standard Architecture |
| **iSCSI** | SCSI over IP |
| **ISDN** | Integrated Services Digital Network |
| **ISNO** | Interface-specific Network Options |
| **ISO** | International Organization for Standardization |
| **ISS** | Interactive Session Support |
| **ISV** | Independent Software Vendor |
| **ITSEC** | Initial Technology Security Evaluation |
| **ITSO** | International Technical Support Organization |
| **ITU** | International Telecommunications Union |
| **IXC** | Inter Exchange Carrier |
| **JBOD** | Just a Bunch of Disks |
| **JFS** | Journaled File System |
| **JIT** | Just-In-Time |
| **L2F** | Layer 2 Forwarding |
| **L2TP** | Layer 2 Tunneling Protocol |
| **LAN** | Local Area Network |
| **LCN** | Logical Cluster Number |
| **LDAP** | Lightweight Directory Access Protocol |

| | |
|---|---|
| **LFS** | Log File Service (Windows NT) |
| **LFS** | Logical File System (AIX) |
| **LFT** | Low Function Terminal |
| **JNDI** | Java Naming and Directory Interface |
| **LOS** | Layered Operating System |
| **LP** | Logical Partition |
| **LPC** | Local Procedure Call |
| **LPD** | Line Printer Daemon |
| **LPP** | Licensed Program Product |
| **LRU** | Least Recently Used |
| **LSA** | Local Security Authority |
| **LTG** | Local Transfer Group |
| **LUID** | Login User Identifier |
| **LUN** | Logical Unit Number |
| **LVCB** | Logical Volume Control Block |
| **LVDD** | Logical Volume Device Driver |
| **LVM** | Logical Volume Manager |
| **MBR** | Master Boot Record |
| **MCA** | Micro Channel Architecture |
| **MDC** | Meta Data Controller |
| **MFT** | Master File Table |
| **MIPS** | Million Instructions Per Second |
| **MMC** | Microsoft Management Console |
| **MOCL** | Managed Object Class Library |
| **MPTN** | Multi-protocol Transport Network |
| **MS-DOS** | Microsoft Disk Operating System |
| **MSCS** | Microsoft Cluster Server |
| **MSS** | Maximum Segment Size |
| **MSS** | Modular Storage Server |
| **MWC** | Mirror Write Consistency |
| **NAS** | Network Attached Storage |
| **NBC** | Network Buffer Cache |
| **NBF** | NetBEUI Frame |
| **NBPI** | Number of Bytes per I-node |
| **NCP** | NetWare Core Protocol |
| **NCS** | Network Computing System |
| **NCSC** | National Computer Security Center |
| **NDIS** | Network Device Interface Specification |
| **NDMP** | Network Data Management Protocol |
| **NDS** | NetWare Directory Service |
| **NETID** | Network Identifier |
| **NFS** | Network File System |
| **NIM** | Network Installation Management |
| **NIS** | Network Information System |
| **NIST** | National Institute of Standards and Technology |
| **NLS** | National Language Support |
| **NNS** | Novell Network Services |
| **NSAPI** | Netscape Commerce Server's Application |
| **NTFS** | NT File System |

| | |
|---|---|
| **NTLDR** | NT Loader |
| **NTLM** | NT LAN Manager |
| **NTP** | Network Time Protocol |
| **NTVDM** | NT Virtual DOS Machine |
| **NVRAM** | Non-Volatile Random Access Memory |
| **NetBEUI** | NetBIOS Extended User Interface |
| **NetDDE** | Network Dynamic Data Exchange |
| **OCS** | On-Chip Sequencer |
| **ODBC** | Open Database Connectivity |
| **ODM** | Object Data Manager |
| **OLTP** | on-line Transaction Processing |
| **OMG** | Object Management Group |
| **ONC** | Open Network Computing |
| **OS** | Operating System |
| **OSF** | Open Software Foundation |
| **PAL** | Platform Abstract Layer |
| **PAM** | Pluggable Authentication Module |
| **PAP** | Password Authentication Protocol |
| **PBX** | Private Branch Exchange |
| **PCI** | Peripheral Component Interconnect |
| **PCMCIA** | Personal Computer Memory Card |
| **PDC** | Primary Domain Controller |
| **PDF** | Portable Document Format |
| **PDT** | Performance Diagnostic Tool |
| **PEX** | PHIGS Extension to X |
| **PFS** | Physical File System |
| **PHB** | Per Hop Behavior |
| **PHIGS** | Programmer's Hierarchical Interactive Graphics System |
| **PID** | Process Identification Number |
| **PIN** | Personal Identification Number |
| **PMTU** | Path Maximum Transfer Unit |
| **POP** | Post Office Protocol |
| **POSIX** | Portable Operating System Interface for Computer Environment |
| **POST** | Power-On Self Test |
| **PP** | Physical Partition |
| **PPP** | Point-to-Point Protocol |
| **PPTP** | Point-to-Point Tunneling Protocol |
| **PReP** | PowerPC Reference Platform |
| **PSM** | Persistent Storage Manager |
| **PSN** | Program Sector Number |
| **PSSP** | Parallel System Support Program |
| **PV** | Physical Volume |
| **PVID** | Physical Volume Identifier |
| **QoS** | Quality of Service |
| **RACF** | Resource Access Control Facility |
| **RAID** | Redundant Array of Independent Disks |

| | |
|---|---|
| **RAS** | Remote Access Service |
| **RDBMS** | Relational Database Management System |
| **RFC** | Request for Comments |
| **RGID** | Real Group Identifier |
| **RISC** | Reduced Instruction Set Computer |
| **RMC** | Resource Monitoring and Control |
| **RMSS** | Reduced-Memory System Simulator |
| **ROLTP** | Relative OnLine Transaction Processing |
| **ROS** | Read-Only Storage |
| **RPC** | Remote Procedure Call |
| **RRIP** | Rock Ridge Internet Protocol |
| **RSCT** | Reliable Scalable Cluster Technology |
| **RSM** | Removable Storage Management |
| **RSVP** | Resource Reservation Protocol |
| **SACK** | Selective Acknowledgments |
| **SAK** | Secure Attention Key |
| **SAM** | Security Account Manager |
| **SAN** | Storage Area Network |
| **SASL** | Simple Authentication and Security Layer |
| **SCSI** | Small Computer System Interface |
| **SDK** | Software Developer's Kit |
| **SFG** | Shared Folders Gateway |
| **SFU** | Services for UNIX |
| **SID** | Security Identifier |
| **SLIP** | Serial Line Internet Protocol |
| **SMB** | Server Message Block |
| **SMIT** | System Management Interface Tool |
| **SMP** | Symmetric Multiprocessor |
| **SMS** | Systems Management Server |
| **SNA** | Systems Network Architecture |
| **SNAPI** | SNA Interactive Transaction Program |
| **SNMP** | Simple Network Management Protocol |
| **SP** | System Parallel |
| **SPX** | Sequenced Packet eXchange |
| **SQL** | Structured Query Language |
| **SRM** | Security Reference Monitor |
| **SSA** | Serial Storage Architecture |
| **SSL** | Secure Sockets Layer |
| **SUSP** | System Use Sharing Protocol |
| **SVC** | Serviceability |
| **TAPI** | Telephone Application Program Interface |
| **TCB** | Trusted Computing Base |
| **TCP/IP** | Transmission Control Protocol/Internet Protocol |
| **TCSEC** | Trusted Computer System Evaluation |
| **TDI** | Transport Data Interface |
| **TDP** | Tivoli Data Protection |
| **TLS** | Transport Layer Security |

| | |
|---|---|
| **TOS** | Type of Service |
| **TSM** | Tivoli Storage Manager |
| **TTL** | Time to Live |
| **UCS** | Universal Code Set |
| **UDB** | Universal Database |
| **UDF** | Universal Disk Format |
| **UDP** | User Datagram Protocol |
| **UFS** | UNIX File System |
| **UID** | User Identifier |
| **UMS** | Ultimedia Services |
| **UNC** | Universal Naming Convention |
| **UPS** | Uninterruptable Power Supply |
| **URL** | Universal Resource Locator |
| **USB** | Universal Serial Bus |
| **UTC** | Universal Time Coordinated |
| **UUCP** | UNIX to UNIX Communication Protocol |
| **UUID** | Universally Unique Identifier |
| **VAX** | Virtual Address eXtension |
| **VCN** | Virtual Cluster Name |
| **VFS** | Virtual File System |
| **VG** | Volume Group |
| **VGDA** | Volume Group Descriptor Area |
| **VGSA** | Volume Group Status Area |
| **VGID** | Volume Group Identifier |
| **VIPA** | Virtual IP Address |
| **VMM** | Virtual Memory Manager |
| **VP** | Virtual Processor |
| **VPD** | Vital Product Data |
| **VPN** | Virtual Private Network |
| **VRMF** | Version, Release, Modification, Fix |
| **VSM** | Virtual System Management |
| **W3C** | World Wide Web Consortium |
| **WAN** | Wide Area Network |
| **WFW** | Windows for Workgroups |
| **WINS** | Windows Internet Name Service |
| **WLM** | Workload Manager |
| **WOW** | Windows-16 on Win32 |
| **WWW** | World Wide Web |
| **WYSIWYG** | What You See Is What You Get |
| **WinMSD** | Windows Microsoft Diagnostics |
| **XCMF** | X/Open Common Management Framework |
| **XDM** | X Display Manager |
| **XDMCP** | X Display Manager Control Protocol |
| **XDR** | eXternal Data Representation |
| **XNS** | XEROX Network Systems |
| **XPG4** | X/Open Portability Guide |

# Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

## IBM Redbooks

For information on ordering these publications, see “How to get IBM Redbooks” on page 195.

- *IP Storage Networking: NAS and iSCSI Solutions*, SG24-6240-01
- *The IBM TotalStorage NAS 200 and 300 Integration Guide*, SG24-6505
- *Implementing the IBM TotalStorage NAS 300G, High Speed Cross Platform Storage and Tivoli SANergy!,* SG24-6278
- *Using iSCSI Solutions’ Planning and Implementation,* SG24-6291
- *A Practical Guide to Tivoli SANergy*, SG24-6146
- *Tivoli SANergy Administrator’s Guide*, GC26-7389
- *IBM SAN Survival Guide*, SG24-6143
- *IBM Storage Solutions for Server Consolidation*, SG24-5355
- *Tivoli Storage Management Concepts*, SG24-4877
- *Getting Started with Tivoli Storage Manager: Implementation Guide*, SG24-5416
- *Using Tivoli Storage Manager in a SAN Environment*, SG24-6132
- *Tivoli Storage Manager Version 4.2: Technical Guide,* SG24-6277
- *Red Hat Linux Integration Guide for IBM eServer xSeries and Netfinity*, SG24-5853
- *AIX 5L and Windows 2000: Side by Side*, SG24-4784
- *Migrating IBM Netfinity Servers to Microsoft Windows 2000*, SG24-5854
- *Using TSM in a Clustered NT Environment*, SG24-5742
- *Planning and Implementing an IBM SAN*, SG24-6116

© Copyright IBM Corp. 2002

# Referenced Web sites

These Web sites are also relevant as further information sources:

- IBM Storage
  http://www.storage.ibm.com/
- IBM TotalStorage
  http://www.storage.ibm.com/ssg
- IBM Network Attached Storage (NAS)
  http://www.storage.ibm.com/snetwork/nas/index.html
- IBM TotalStorage Network Attached Storage 200
  http://www.storage.ibm.com/snetwork/nas/200/index.html
- IBM TotalStorage Network Attached Storage 300
  http://www.storage.ibm.com/snetwork/nas/300/index.html
- IBM TotalStorage Network Attached Storage 300G
  http://www.storage.ibm.com/snetwork/nas/300g_product_page.htm
- IBM Storage Networking Technical Support
  http://www.ibm.com/storage/support/nas
- Tivoli
  http://www.tivoli.com/
- BakBone Software
  http://www.bakbone.com/
- LEGATO
  http://www.legato.com/
- VERITAS Software
  http://www.veritas.com/
- NSI-Software
  http://www.nsisoftware.com/
- Storage Networking Industry Association
  http://www.snia.org/
- Sysinternals Microsoft Tools
  http://www.sysinternals.com/
- Linux Documentation
  http://www.linuxdoc.org/
- Internet SCSI Draft
  http://www.ietf.org/internet-drafts/draft-ietf-ips-iscsi-05.txt
- Internet SCSI Documentation
  http://www.ece.cmu.edu/~ips/Docs/docs.html

- Network Data Management Protocol
  http://www.ndmp.org

# How to get IBM Redbooks

You can order hardcopy Redbooks, as well as view, download, or search for Redbooks at the following Web site:

**ibm.com**/redbooks

You can also download additional materials (code samples or diskette/CD-ROM images) from that site.

## IBM Redbooks collections

Redbooks are also available on CD-ROMs. Click the **CD-ROMs** button on the Redbooks Web site for information about all the CD-ROMs offered, as well as updates and formats.

# Index


## A
AntiVirus 9
author list xvii
availability features 2

## B
Backup and Recovery Wizard 57
Backup Exec 115
  agent configuration 117
  agent installation 117
  Assistant 126
  backup procedure 126
  backup wizard 127
  Introduction 116
  job verify 136
  method 130
  monitor jobs 133
  remote install options 120
  schedule options 132
  verification 131
backup process overview 6
BakBone 91
block I/O 180

## C
considerations 2

## D
Data availability
  hardware 2
  software 3
differential backup 7
disaster recovery planning 68
Double-Take 15, 38
  Connection Wizard 44
  Creating a Mirror 43
  Defining Replication Set 47
  description 39
  features 39
  High availability 39
  installation 40
  Local data replication services 39
  Multi-Platform 40
  Off-site data replication services 39
  operations 40
  Resource utilization 39
  setup 41
dsm.opt 72

## F
file I/O 180
full backup 7

## I
I/O protocol 180
IBM Tivoli Storage Manager advantages
  Unique Differentiators 72
IBM TotalStorage IP Storage 200i 182
  recovery 182
IBM TotalStorage NAS 300
  Recovery 11
IBMSNAP 7, 38, 59
  and PSM creating an image 61
  batch file 85
  Removable Disk 63
  Scheduled NT Backup 64
  Scheduled TSM Backup 90
  with NTBackup 60
  with TSM 85
IBMSNAP.EXE 7
incremental backup 7
Introduction 1
iSCSI 179
  Backup and recovery 181
  backup and restore considerations 179
  block I/O 180
  encapsulates SCSI commands 181
  introduction 180
  recovery 182
  restore configuration 184
  topology 181

## L
Legato 163


© Copyright IBM Corp. 2002

Local data replication services 39

## M

maintenance partition 4, 10

## N

NAS
  Archival backup 4
  Archival backup of user data 5
  Archival copy 4
  recovery after cluster fails 11
  recovery procedures 9
NAS 200
  recovery 10
NAS 300
  recovery 11
NAS Admin.msc 52
NAS appliances
  archival 4
  backup 4
  restoration 4
NAS Backup Assistant 52, 65
  launch 53
  perform backup 53
NetBackup 139
  agent configuration 141
  agent installation 141
  backup class 150
  backup options 160
  backup start 159
  backup type 155
  client list 153
  client options 145
  introduction 140
  OTM install 143
  policy configuration 151
  policy management 150
  rotation 156
  server configuration 149
  Wizard 149
NetBackup DataCenter 139
NetVault 91
  Agent Configuration 93
  Agent Installation 93
  backup options 109
  backup schedule 110
  Backup start 107
  backup target 111
  Client Management 104
  client selection 108
  device management 111
  Dynamically Shared Drives 99
  file system plug-in 108
  introduction 92
  job monitor 113
  network compression 112
  Server configuration 103
  SmartClient technology 99
  welcome screen 94
NetWorker 163
  Administrator 171
  agent configuration 165
  agent installation 165
  allowed servers 168
  Backup 177
  Backup start 176
  Backup status 178
  create client 173
  introduction 164
  manage clients 172
  Server configuration 171
  setup type 167
NSI Software 38
NT Backup 4, 51
  Backup and Recovery Wizard 57
  restore 57
  scheduled 64
  with IBMSNAP 60

## O

Off-site data replication services 39
Open Transaction Manager 16

## P

Persistent Storage Manager. see PSM
Persistent True Image 16
pre-loaded software 3
PSM 15
  and IBMSNAP creating an image 61
  archival backup access 5
  automated TSM backup 87
  backup software solutions 37
  batch file 85
  Cache full warning threshold 24
  Cache size 25
  clustered environment 36

Configuring 21
copy-on-write 17
Creating a Scheduled Image 28
Creating an image 25
Creating an Immediate image 25
Creating images 19
definition 16
Disaster Recovery 32
first image 18
how it works 16
IBMSNAP 38, 59
image directory 22
Image restoration 8
main screen 21
Maximum images 22
NAS Volume 17
Performance impact 18
Persistent True Image 16
process priority 18
Quiescent period 22
Quiescent time-out 22
Read Performance 19
Reading True Image 18
Removable Disk 63, 86
True Image 16
with TSM 85
Write performance 19

## R

Recovery CD-ROM 4, 10
Recovery Enablement Diskette 10
recovery execution 68
recovery procedures 9
Redbooks Web site 195
Contact us xx
Replication 15

## S

scheduled 90
SCSI 180
Snapshots 15

## T

Third Party product support 8
Tivoli Data Protection 8
Tivoli Storage Manager. see TSM
True Image 16
TSM 1, 67
24 x 365 application protection 69
Agent installation 72
Archive-Retrieve 69
automated backup of persistent image 87
available backups 89
Backup Archive GUI 73, 83
backup details 90
Backup report 84
Backup selection 83
backup start 83
Backup-Restore 68
batch file 85
Client Configuration Wizard 73
client node configuration wizard 79
Data transfer 71
Disaster preparation and recovery 68
dsm.opt 72
Enterprise management 70
Hardware support 71
Hierarchical Storage Management 69
introduction 68
Management automation 70
with IBMSNAP 85, 90
TSM Agent configuration 72

## V

VERITAS 115, 139
virtual image 7

IBM Redbooks

# IBM TotalStorage NAS Backup and Recovery Solutions

(0.2”spine)
0.17”<->0.473”
90<->249 pages

# IBM TotalStorage NAS Backup and Recovery Solutions

**Integrate backup software from BakBone, Legato, Tivoli, and Veritas**

**See snapshot and replication technology for NAS**

**Learn backup concepts for iSCSI**

This IBM Redbook is a guide for backup and recovery solutions for IBM TotalStorage NAS and iSCSI appliances. It provides a detailed description of how to implement various backup and restore solutions.

This hands-on guide starts with an introduction to IBM TotalStorage NAS backup and recovery solutions and covers general concepts. After that you will learn about persistent storage images and data replication techniques. Then you will see various solutions for popular backup and recovery software.

This book covers the following backup software products: Microsoft Windows NT Backup, Tivoli Storage Manager, BakBone Software NetVault, Veritas BackupExec and NetBackup, and Legato NetWorker.

Additionally, the book includes tools and utilities provided by IBM to support backup of the IBM TotalStorage NAS devices, as well as special considerations for iSCSI environments.

**INTERNATIONAL TECHNICAL SUPPORT ORGANIZATION**

**BUILDING TECHNICAL INFORMATION BASED ON PRACTICAL EXPERIENCE**

IBM Redbooks are developed by the IBM International Technical Support Organization. Experts from IBM, Customers and Partners from around the world create timely technical information based on realistic scenarios. Specific recommendations are provided to help you implement IT solutions more effectively in your environment.

**For more information:**
**ibm.com**/redbooks

SG24-6831-00 ISBN 0738426296